JULY 3, 1941

The IRON AGE

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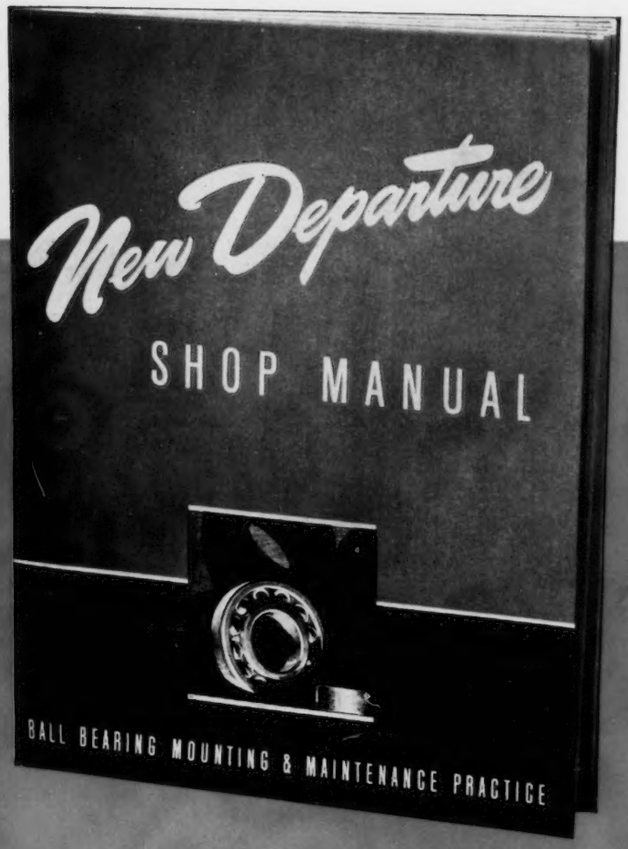

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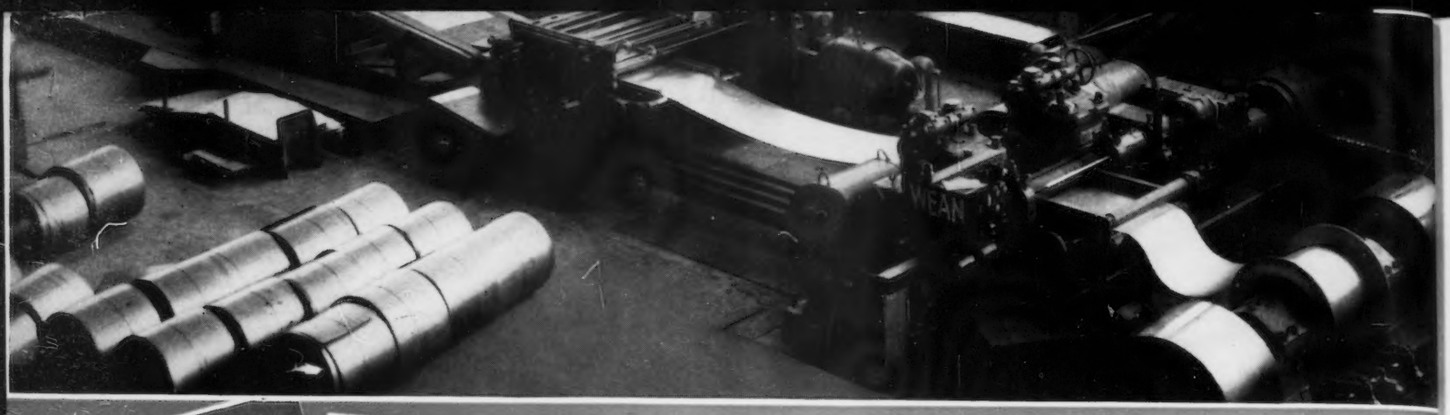

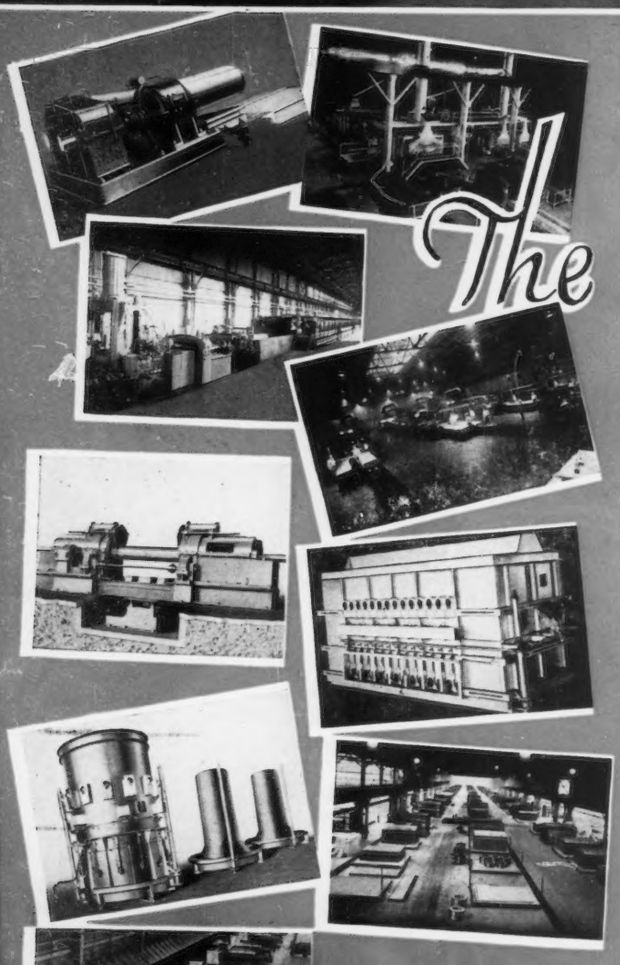

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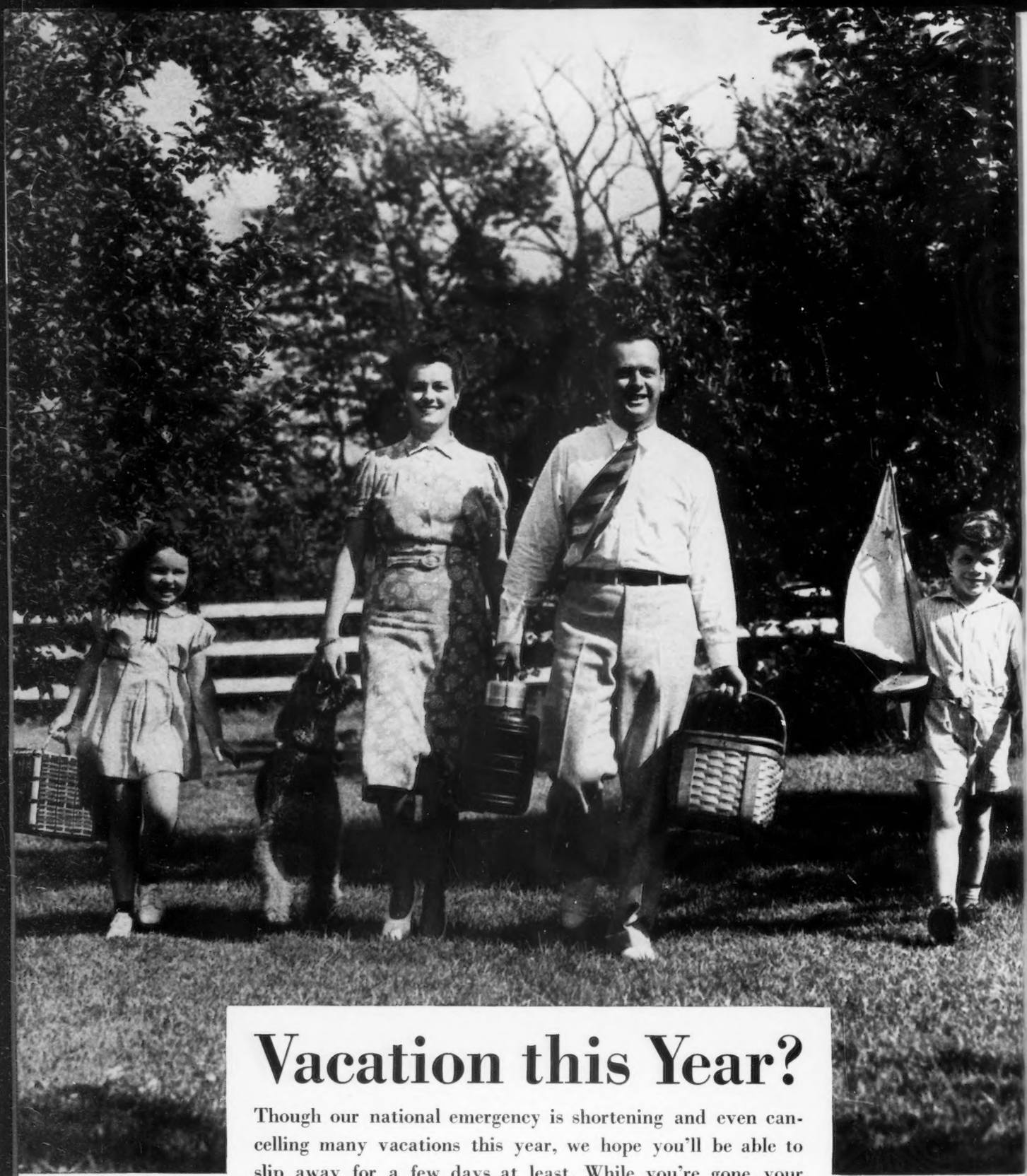

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The Iron Age

JULY 3, 1941

ESTABLISHED 1855

Shortages and Capacity

THE steel industry will make a serious mistake if it permits the brain trusters and business "busters" to stampede it into building 10 million tons of additional ingot capacity.

Here and there, of course, there will have to be additions made because of the abnormal emphasis which war and defense place upon certain specialized products. Electric furnace steels are a case in point. But here we have need of *adjusting* total capacity rather than increasing it.

And when it comes to the matter of adjustments, the one that is most seriously needed is that of apportionment of supply. So long as we have 75 per cent of our present steel making capacity available for non-defense business, the chief reason for any one's not getting the steel he needs to make the products that his customers need is the maladjustment of demand to capacity. This sounds rather involved, but it really isn't.

We can simplify it by imagining that steel is flour.

One would say that a nation had ample flour milling capacity if its mills were capable of grinding enough wheat to make enough bread to feed all of its people. Under such circumstances, any shortages that would develop would be due to demand being out of adjustment to needs and not due to any lack of capacity.

Suppose, for example, that an impending flour shortage was rumored. Suppose that Government economists advertised it from the housetops in Washington. What do you think would happen?

Instead of buying her customary one bag of flour, your wife would buy two or three bags. She would try to protect the interests of the family pantry by stocking up. And so would millions of other women.

Now even were the capacity of the flour mills of the country half again as much as need be, if all of these women merely bought one extra bag, an immediate shortage would develop which would be equivalent to three months' operation of the flour mills. It would be a temporary shortage, of course, and would work itself out in time unless the "scare" was repeated. But during that period the shelves of the grocery stores would be bare of flour.

Under such circumstances, it would be silly to suggest increasing the nation's flour milling capacity. For by the time that was accomplished, the need for it would be over.

That is exactly the situation today in respect to steel. If you are not getting the steel you need, it is not because of that small 25 per cent of our annual output that is going into defense and aid to Britain. It is because some one else is getting more than he needs of the remaining 75 per cent. And you cannot cure that by a general expansion program that will take two years to get going.

J. H. Van Deventer

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Screw Machine Tooling For Munitions Parts

° ° °

By FRANK J. OLIVER
Machine Tool Editor, The Iron Age

° ° °

THE special tooling arrangements, illustrated in detail, have been worked out by engineers of the National Acme Co., Cleveland, for three typical ammunition components—the M-20 booster, the 37-mm. high explosive shell and machine gun bullet cores. The tooling for the booster body is particularly ingenious, while the decision to machine the tungsten-chrome bullet cores in an eight spindle machine represents the culmination of much preliminary work and many experimental tries to accomplish the result in other types of automatics, from one spindle, up. The H-E shell is a typical second operation set-up.

° ° °

AUTOMATIC screw machines are being called upon to carry the bulk of the production of small size shell and bullet cores and of fuse parts for bigger shells because of the economics of tooling up for large quantity production. Such parts lend themselves to ready production from bar or wire stock. In fact, the choice is not between doing this work on automatics but in selecting the machine of the necessary number of spindles and tooling to perform as many operations as possible in one set-up; or in the case of the tougher materials, to subdivide the operations so as to maintain economical tool life and relatively high production. For the purpose of illustrating some of the principles of tooling involved, we have selected three typical munitions parts, Fig. 1, all of which run into large quantities and which a large number of industrial plants have been called upon to make. Some of the tooling was developed for government arsenals, but has been duplicated by outside contractors.

Because of its unusual design, the M-20 booster, one of the connecting links between the timing mechanism in the nose of a shell and high explosive charge, presents a manufacturing problem calling for considerable ingenuity in its solution. This piece, shown at the right in Fig. 1, is made from half hard, common brass in the form of 2-in. bar stock. Except for drilling and tapping some small bore holes, the piece is completed in one setup in an eight spindle, 2⅝ in. model RA Acme-Gridley automatic bar machine. The machining cycle includes two external threading operations, one internal threading operation, boring of an eccentric hole in the base of the main bore, and slotting of the open end, all performed without stopping the rotation of the work spindles. Gross production is 276 pieces per hour. Fig. 2 illustrates the tooling layout.

First operation on the M-20 booster is that of drilling a 1 9/32 in. hole in the end of the bar while the body is rough formed over half its length and the outer end chamfered. This is done in position No. 8, or the lower rear spindle of this machine where the stock is fed out. Forming is done by a circular tool carried on the lower rear cross slide. Work spindle rotates at 728 r.p.m. (121 ft. per min. at 2 in. maximum diameter) and the feed of the tool slide, which carries the drill, is 0.0088 in. per rev., with a total feed of 1 in.

Second operation at station 1 is to finish form the rear contour of the piece, turn the front thread diameter with a knee turner on the

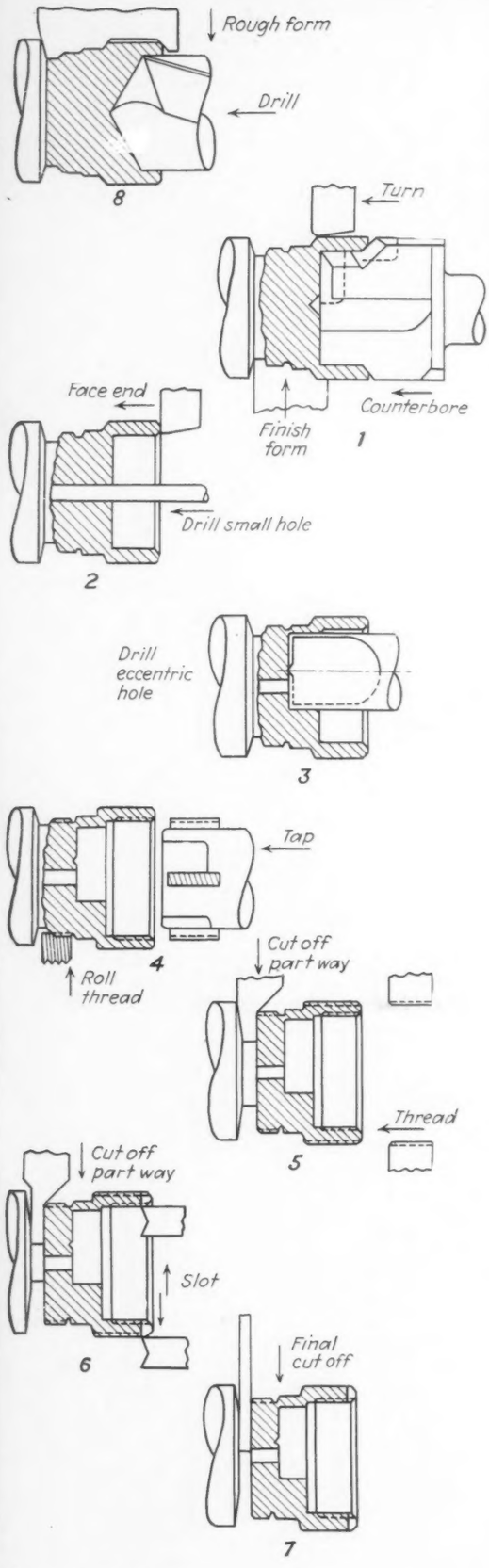

FIG. 2—Sequence of operations for producing the M-20 booster on an eight-spindle automatic bar machine.

octagon tool slide, and square bottom and chamfer the previously drilled hole in front. At this station, the form tool is a tangent type with dovetail back, carried on the lower front cross slide.

In the third operation, the end of the piece is faced to length with a knee turner on the end tool slide and at the same time a No. 7 drill (0.201 in.) driven by an auxiliary air drill spindle is used to drill the small hole in the center of the booster body. Because of the relative speed of work and drill, the actual feed becomes 0.0035 in. per rev. for this drilling operation.

Eccentric Drilling Operation

The fourth operation, at station 3, is one of the most interesting on the piece. This is drilling an eccentric hole in the base of the bore. In some types of automatics such an operation might be performed by driving the spindles through friction disks so that the spindles can be stopped in this position by a suitable brake while an auxiliary spindle on the tool slide performed the drilling operation off center. So much power is required on other operations, however, that National-Acme has chosen instead to perform this operation without stopping the work spindle rotation. This is done through the use of a special drilling rig, illustrated in cross-section in Fig. 3. A special flat bit is used, carried in a ball bearing mounted quill which is on the same axis with and rotates at the same speed as the work spindle in this position. Within this quill the drill holder proper is mounted eccentrically, in needle bearings, an amount corresponding to the off-center position of the hole being drilled. Constraint of the drill against rotation at the same speed as the quill is obtained by a gear, integral with the drill spindle. This gear engages a fixed internal gear concentric with the main quill and bolted to the housing of the drilling unit.

The ratio of gear teeth is 28:33 or a difference of five teeth so that the drill has an absolute speed of rotation of 5/33 of the spindle speed or 110 r.p.m., in the reverse direction. Relative to the work, which is rotating at 728 r.p.m. forward, the drill speed is therefore 838 r.p.m. To watch this operation, however, one would get the impression that the drill was slowly rotating about its own axis while describing a gyratory path in a circle about 5/16 in. in diameter. A modified tooth form had to be developed for this pair of internal and external gears, which are cut on a Fellows gear shaper with a special circular cutter.

At station 4 two threading operations are combined, one internal threading, the other external threading of the smaller threaded diameter. This outside thread is produced by a small double thread roll mounted in a special fixture carried on the top front side tool slide. This thread roll is given a straight infeed at the lead angle and is free to rotate on its own axis, being driven by friction of the work itself. The diameter of the blank which was finish formed in the second operation is slightly under the pitch diameter of the finished screw in size. In the design of this double thread roll, it is necessary to make the pitch diameter a factor of the pitch diameter of the thread being cut and the number of starts on the thread rolls must be a factor of the number of threads per inch of the screw being cut; that is, a 24 th. screw, for example, may be cut with a roll of 2, 4, 6 or 8 starts. Otherwise it becomes almost impossible to make this thread roll on a lathe having a standard lead screw and the usual change gears.

The internal thread is cut with a standard 1⅞ in. type CR Namco collapsible tap mounted in a threading attachment on the main end tool slide and driven off a jackshaft.

In the fifth station a flat form tool in the side slide begins the cutting-off operation which is done in three steps; otherwise, this would be the longest operation on the piece. As it is now, the initial drilling operation at station 8 is the controlling one from the point of view of production time, which is 13 sec. per piece, machine time. At the fifth station, threading is also performed on the larger of the two external threads, using a standard 2⅜ in. type DR Namco self-opening die head with ground thread circular chasers and another threading attachment driven off a jackshaft.

Slotting Attachment

At station 6, cut-off is continued with a flat form tool held in an independent side slide, and the open end of the booster body is slotted with a special attachment on the end tool slide, detailed in Fig. 4. As in the example of the

eccentric drilling operation, this slotting is performed on the body while it is rotating and the slotter tools are carried on the end of an auxiliary spindle driven off the main drive shaft at the same speed as the work spindle. The two tool bits oscillate back and forth with each spindle revolution, and being fishtail in shape they cut in each direction. Reciprocation of the dovetail slide in which the tools are mounted is obtained by a pair of opposed roller contacts engaging a hardened raceway which is eccentric to the spindle axis. An eccentricity of about ½ in. gives a total tool reciprocation of 1 in.

Final cut-off takes place at the seventh and last station. Since no side slide is employed for position 7, this tool is mounted double-decker fashion on top of the form tool holder on the rear side slide at position 8, at which it will be recalled the initial forming operation on the booster body is performed.

Second Operation Work

Another example selected for study is the second operation set-up for finishing the body of a 37 mm. M-54 high explosive shell as it illustrates how even a magazine chucking set-up can be made fully automatic. When it reaches this machine, which is a 1⅝ in. model RA 8 Acme-Gridley, this piece is 1.453 in. in diameter and 4.13 in. long. It is made of a modified SAE X1335 cold drawn steel. It has already been turned on the o.d., bored at one end and banded. As shown in the tooling layout, Fig. 5, the piece is automatically checked in a set of special collets from a magazine feed. Ejection of the finished piece and loading both take place at station 7.

Turning of the copper band is done in two steps at stations 8 and 1 respectively by carbide tipped tools mounted in knee turners on the end tool slide which has a feed of 0.0039 in. per rev. (288 r.p.m.) and a total feed of only ⅜ in. which is why in this particular case the facing cut on the band cannot be made in one step. Also at station 8 a ¾-in. drill starts a hole at the closed end of the shell body, which hole is then progressively drilled 31/64 in. in diameter in the next three stations, 1, 2 and 3. At station 2 a dovetail type form tool mounted on a double-decker tool post on the front cross slide forms the groove ends of the band and puts a groove in the steel body in front of the band. This form tool is backed up by a roller acting against the steel land on the shell. At the same time a facing tool on the end tool slide comes in with the drill to face the end.

At station 3, drilling is continued to final depth with a specially ground step drill and a chamfering tool bevels the edge of the hole. Stenciling of the band is done in station 4 as well as flat bottoming of the small bore with a specially ground drill. Stencil roll is moved in tangentially to the piece so that a back up roller support can be brought in at the same time. The same principle is also applied for the movement of the form tool at station 2.

Accelerated reaming of the 31/64 in. hole to ½ in. is performed at station 5 with the aid of an attachment and at the same time the end support is finish faced. Final operation, at station 6, is to drill a 0.209 in. hole through to the main cavity. This is done with a standard high speed drilling attachment mounted on the end tool slide, and mechanically driven off the machine jackshaft. In another machine this hole is tapped ¼ in.-28 N. F. threads. Machine time on the automatic is 23 sec. or a gross production of 156 pieces per hr.

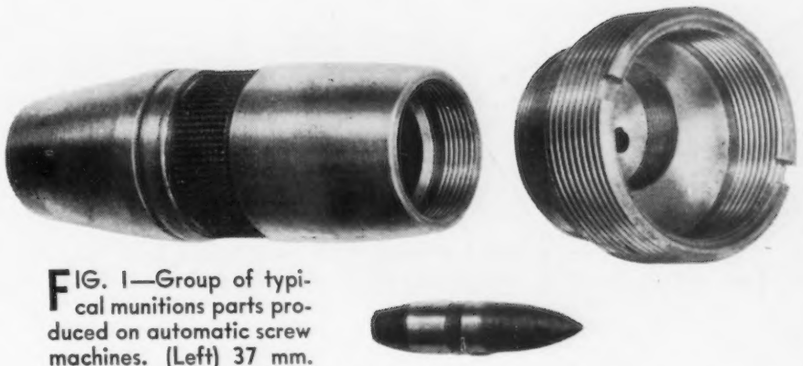

FIG. 1—Group of typical munitions parts produced on automatic screw machines. (Left) 37 mm. high explosive shell. (Right) M-20 booster. (Center) 0.50 caliber machine gun bullet core.

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Turning Bullet Cores

Turning extremely tough material like SAE 74100 tungsten chrome steel for 0.50 caliber ma-

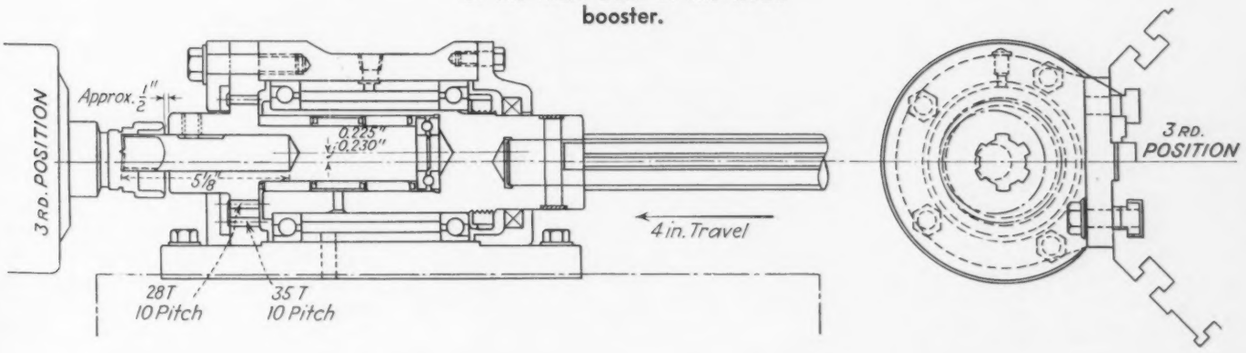


FIG. 3—Cross-section of special drilling head mounted on the octagon tool slide for drilling an eccentric hole in the base of the main bore of the M-20 booster.

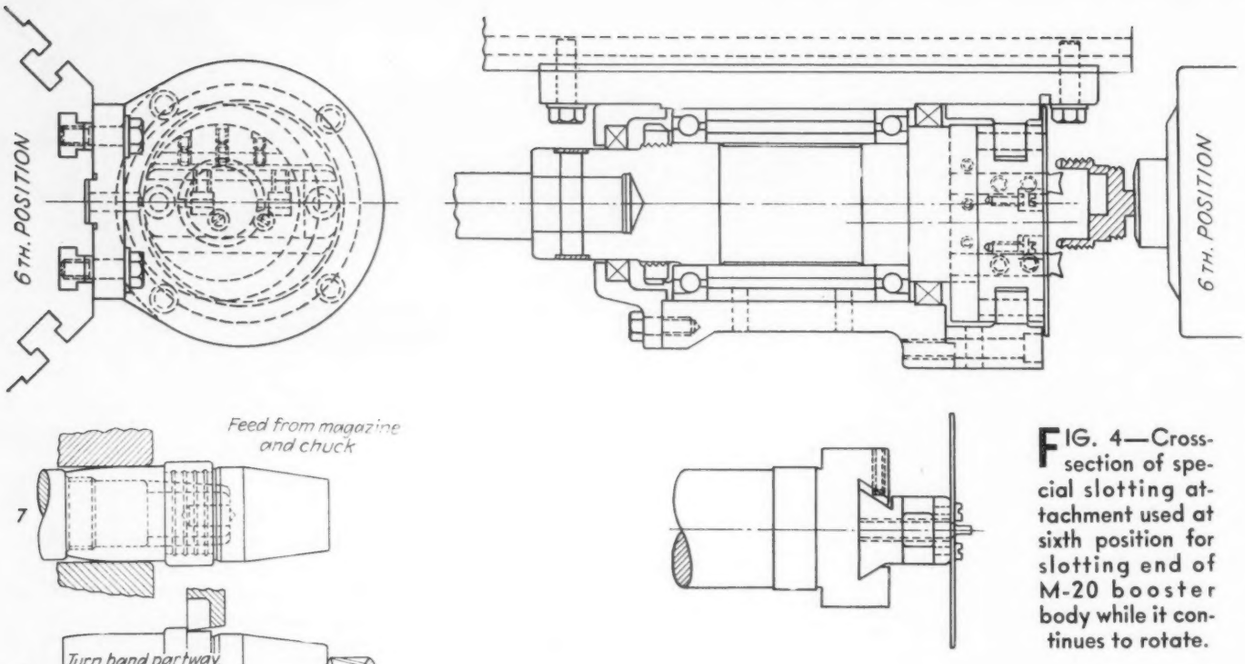
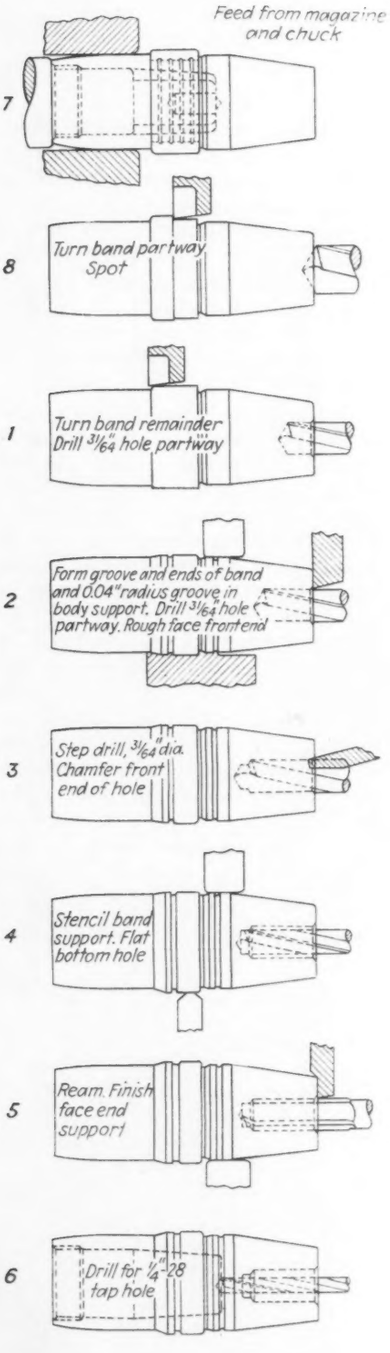


FIG. 4—Cross-section of special slotting attachment used at sixth position for slotting end of M-20 booster body while it continues to rotate.


Feed from magazine and chuck
7
8
Turn band partway Spot
1
Turn band remainder Drill 31/64" hole partway
2
Form groove and ends of band and 0.04" radius groove in body support. Drill 31/64" hole partway. Rough face front end
3
Step drill, 31/64" dia. Chamfer front end of hole
4
Stencil band support. Flat bottom hole
5
Ream. Finish face end support
6
Drill for 1/4"-28 tap hole

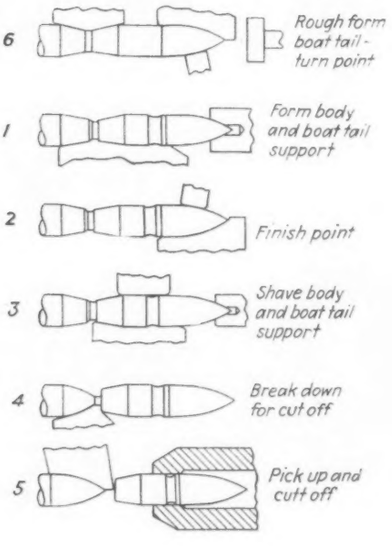
LEFT

FIG. 5—Sequence of second operation work on a 37 mm. M-54 high explosive shell on an eight spindle automatic.

o o o

BELOW

FIG. 6—Operation sequence for production of 0.50 caliber tungsten chrome bullet cores from 29/64 in. round ground stock. When the stock is fed out at station 6, the nose has already been rough formed during the process of cutting off the preceding piece.



chine gun bullet cores necessitates breaking down the operations into a number of stages in order to obtain economical tool life. Attempts have been made to turn these bullet cores on single spindle machines and also to turn the cores in three stations, double tooled in a six spindle bar turning machine. Neither were satisfactory because each tool was called upon to do too much work. National Acme believes the final answer is in the set-up shown in the tool layout, Fig. 6, for a six-spindle bar machine, with each station tooled separately, giving a gross output of 554 pieces per hour, or 6.5 sec. per piece. In addition, the final cut-off is arranged in such a manner that a second operation is not required to face the nib off the boattail of the core.

For the 0.50 caliber core, the material is in the form of ground stock 29/64 in. in diameter. Spindle speed is 611 r.p.m., giving a cutting speed of 70 ft. per min. on the maximum diameter. High speed steel tools are used throughout. Provision is made at every station for quick set-up of tools by means of simple swing-type gages permanently attached to the tool posts.

Cycle begins at station No. 6 when the stock, already rough formed at the nose, is fed forward against a stop button. In fact, during operations on the preceding piece, the nose of the succeeding piece is broken down in four steps. For instance at this station, a form

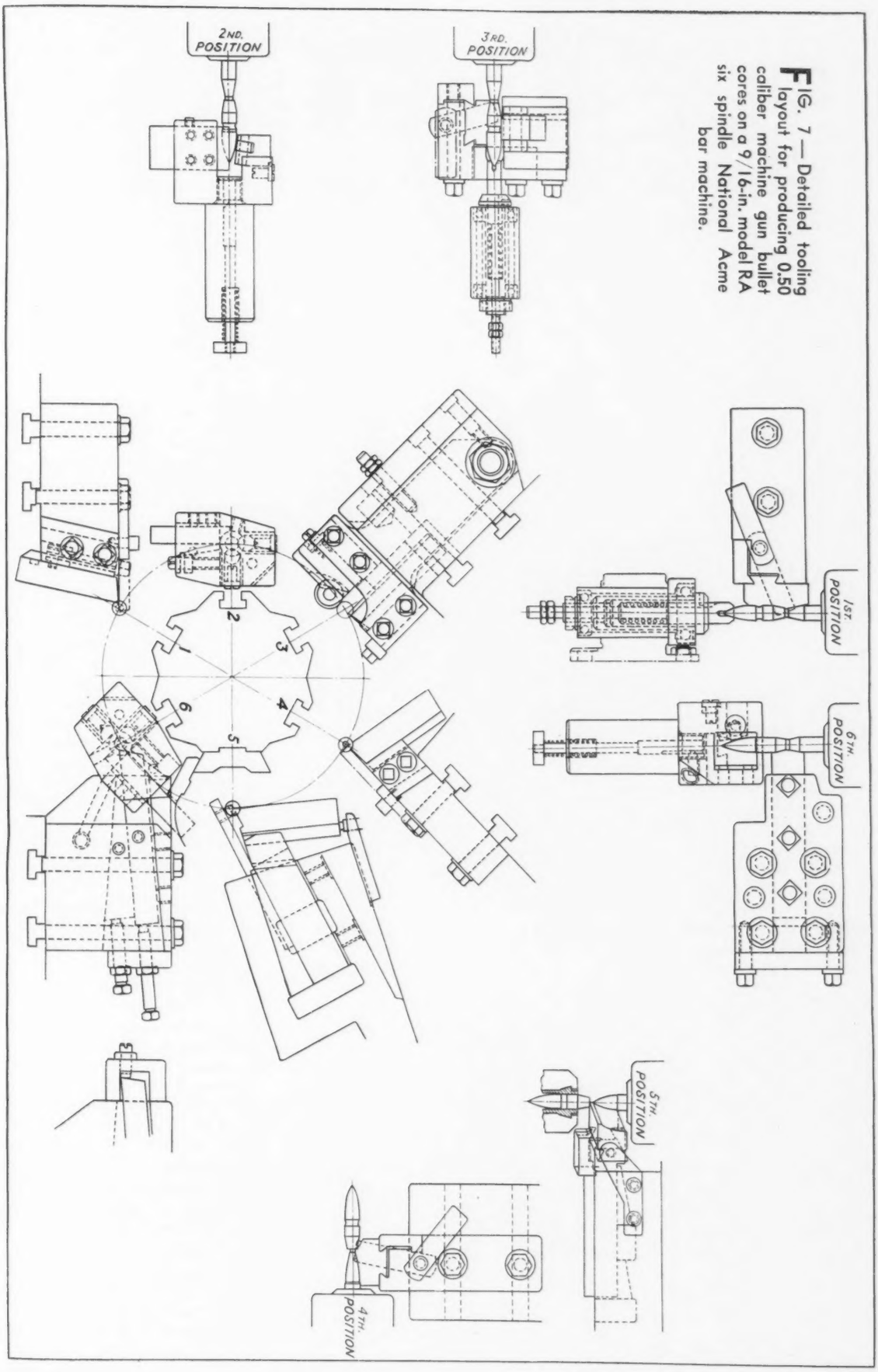


FIG. 7 — Detailed tooling layout for producing 0.50 caliber machine gun bullet cores on a 9/16-in. model RA six spindle National Acme bar machine.

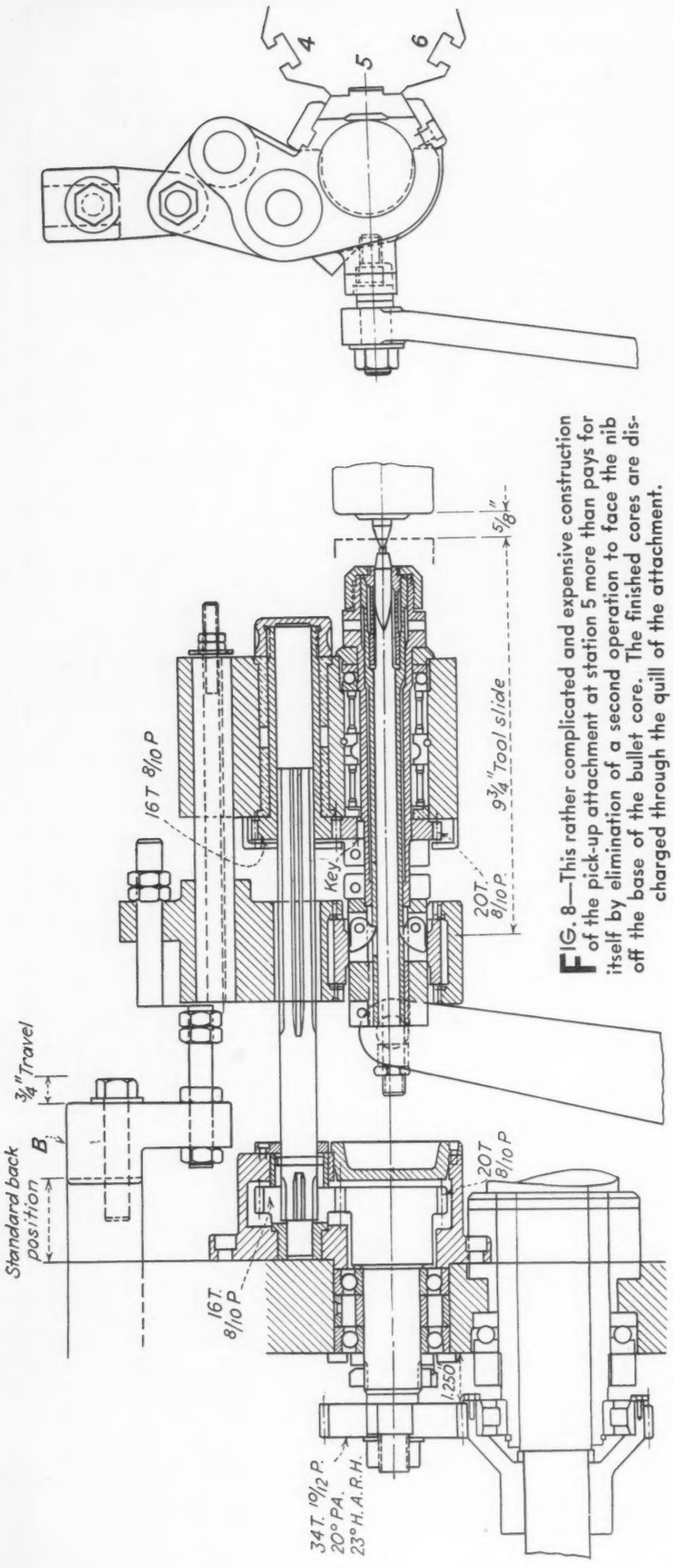


FIG. 8—This rather complicated and expensive construction of the pick-up attachment at station 5 more than pays for itself by elimination of a second operation to face the nib off the base of the bullet core. The finished cores are discharged through the quill of the attachment.

tool on the lower rear cross slide is fed straight in to rough form the boattail and start to breakdown the nose of the following piece. This tool, cutting on the work centerline, is set through the aid of a simple U-shaped gage which is brought to bear against the toolholder assembly. Initial adjustment of the gage is obtained by setscrew and locknut. This can be seen in the detail, Fig. 7, lower right. Turning of the core point is done at this station by a modified roller turner, the roller being mounted at an angle to the work axis and the direction of tool feed. Tool slide feed is ¼ in.

Final finish forming of the point is done at station No. 2 with a box turner and profile tool, really a shaving operation since only a few thousandths of stock is removed. Before this is done, however, at station No. 1, the body is formed or necked just to the rear of the bourrelet and the boattail support is partially necked down. At this station, the rough formed nose is supported in a ball bearing live center. Since the form tool is 2 in. in width and is not backed up by a roller because of the amount of stock being removed, this female center is a heavy mandrel with a generous size ball bearing carrying the overhung load at the inboard end. Since it is necessary for this center point to engage the core at the start of the cut, timed with the start of the tool slide feed, the center mandrel proper is backed up by a heavy spring and has ¼ in. movement within its supporting sleeve.

At station 1, setting of the dovetail backed form tool, which is mounted on the front cross slide, is facilitated by a simple pivoted flat bar which can be swung over the tool slide to act as a stop for the tool on the work centerline. This centerline necessarily must correspond with the top face of the tool block on which the stop bar is pivoted. The same type of tool setting gage is employed at stations Nos. 3, 4 and 5, except that in the last named station because of the peculiar shape of the tool holder the tool contact button is on the end of a stud instead of the flat bar itself.

At station No. 3, the core body and boattail support are shaved with a heavy dovetail shaving tool of the roller rest type, fed in from the upper left cross slide much like a snap gage would be slipped over

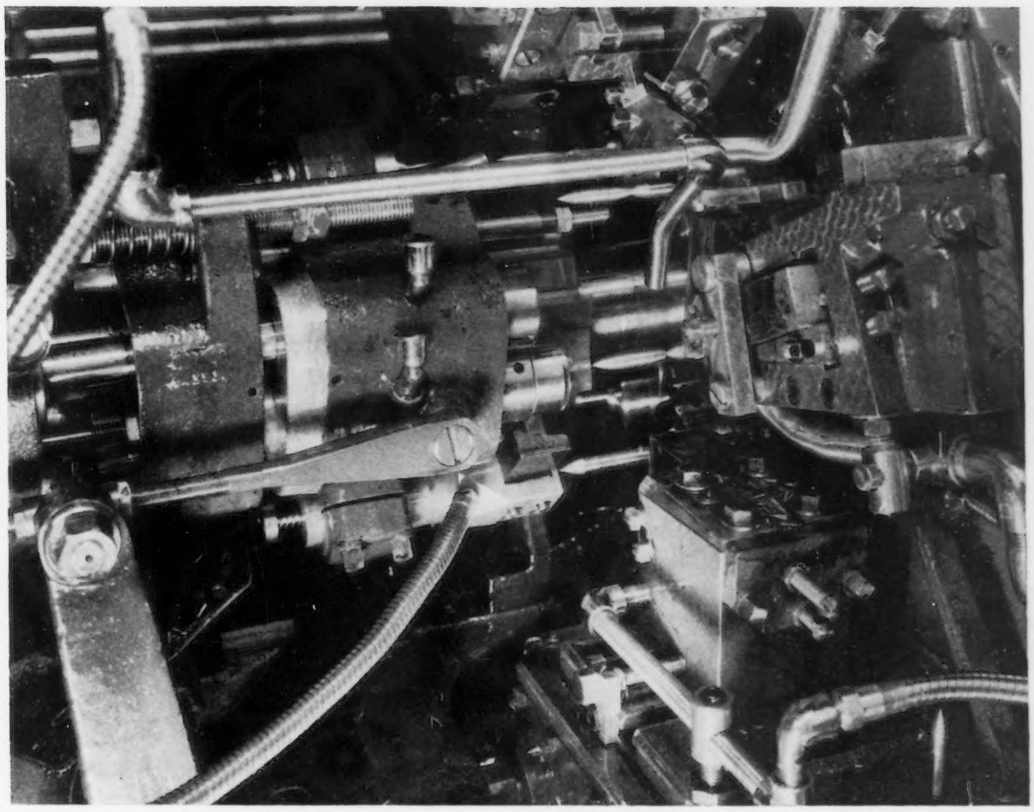


FIG. 9 — Rear view of the 9/16-in. bar machine tooled for turning bullet cores. Stations 5 and 6 and the pick-up attachment may be seen.

the work diameter. Tip of the core is supported in a ball bearing support as at station No. 1 except that since the greater part of the tool reaction, namely the normal component, is taken by the roller, the live center is smaller in diameter and is supported on lighter bearings. This live center is carried similarly on the main tool slide and has spring take-up during the feed part of the cycle.

At station No. 4, further breakdown of the nose of the following piece is carried on preparatory to cut-off in the next station. Since the tool is working close to the collet chucks, it is not necessary to support the work by a live center or by a roller rest as in the previous station. A dovetail backed form tool is used, being mounted in a tool block carried on the upper right cross slide.

In the fifth and last position, the work is picked up and cut off in such a manner that the tool is carried past the work center, removing the nib entirely and facing the end so that no additional operation is necessary except to solder a reinforcing disk to absorb some of the impact of the propellant charge. Cut-off is accomplished by a form tool which also shapes the nose of the following piece, this tool being carried on a holder on an auxiliary cross slide actuated by a special two-step cut-off cam, giving 5/64 in. feed at 0.0023 in. feed rate and 1/32 in. at 0.0015 in. The second step of the feed carries the cut-off point past the work center, giving the effect of what would normally be a second operation on the tail end of the core.

What makes this operation possible is a special rotating pick-up attachment, shown in cross-section in Fig. 8. This unit looks complicated and is costly to build, but pays its way by eliminating the second operation. The attachment is gibbed to the main tool slide on V-ways and is reciprocated independently of the latter. Essentially you find in this unit a means of rotating a collet chuck in step with the work spindle speed of 611 r.p.m., means for drawing the collet tight after it is slipped over completed core prior to cut-off, and a means for feeding the cores out through a hollow spindle in the attachment. It is for this last named reason that power for drive is carried up and around through a series of spur gears and jackshaft instead of driving straight through. Each time the stock is advanced, a finished core is pushed one length along the collet tube, dropping off the far end into a work trough. Main advance of the attachment toward the work is by a rocker arm and link. Collet closing is effected by a secondary travel of ¾ in. of the auxiliary member B. It will be noted that this collet is of the stationary finger type with the cone the moving member. The cone is pushed forward by the aforementioned stock discharge tube when the two fingers are cammed toward the center. Main quill is carried in needle bearings and the facing thrust is taken by a ball thrust plate bearing. Jackshaft is carried in bronze sleeve bearings because of space limitations.

Electroplaters Debate Year's Developments

LAST week's report on the annual electroplaters' convention held at Boston is here continued with papers on solutions, their purity and acidity, on radiant heat baking, on equipment, electropolishing and electrocolor.

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"CHEMICAL and Electrochemical Methods for the Purification of Plating Solutions," was the title of a paper by O. A. Stocker, Rufert Chemical Division of the Seymour Mfg. Co., Seymour, Conn., in which he pointed out that a large part of our present plating difficulties can be traced to impurities of one sort or another, metallic compounds or organics. They can be identified by the analysis of the metallics or by the bent cathode or the Hull cell test for organics. The bent cathode shows a dark area in the right angle bend. The Hull cell shows up impurities over the whole range, from low current density to 140 amp. per sq.ft. by the characteristics of the test panel deposit.

Precipitation and filtration are satisfactory for heavy metals in acid and alkaline baths, and for carbonates in cyanide solutions. It is also satisfactory to raise the pH of low pH baths to precipitate out impurities.

Change in the constitution of impurities is recommended for organics (by severe oxidation and reduction) to destroy the compounds, and then filtration through activated carbon to eliminate the balance of impurities.

Co-deposition of impurities is applicable to both metallic and organic impurities at low current densities on dummy cathodes. Such electro-deposition involves control of the pH and temperature, proper agitation, the ratio of the impurities to the metal normally deposited, the cathode reaction and position of the metal in the electromotive series.

In nickel solutions, impurities may consist of copper, lead, cadmium, iron, zinc, selenium, aluminum, chromium, magnesium, calcium, carbon dioxide and dissolved oxygen. Organic impurities may come from buffing compounds and faulty tank lining. Raising the pH to 6.2-6.4 electrometric by the addition of nickel hydroxide, nickel carbonate, calcium hydroxide, hydrogen peroxide or potassium bichromate, removes iron, zinc, trivalent chromium, selenium, cadmium, bivalent copper. Additions are made as a wet slurry of the chemical in hot water and added to the solution gradually, with vigorous stirring. A typical procedure is to heat the bath to 140 deg. F., and then add nickel carbonate as a wet slurry, slowly, with stirring until the pH is 5.6-5.8. This should take about 2 to 4 lb. of the nickel carbonate per 100 gal. of solution. Then add a slurry of lime in the same fashion until the pH is about 6 to 6.2. This should take about ¼ lb. per 100 gal. Then add ½ pint of 100 volume hydrogen peroxide per 100 gal. of solution; stir and filter.

The Liscomb method of removing impurities is to add 12 oz. of ferrous sulfate per 100 gal. of solution, raise the temperature to 140 to 160 deg. F.; add nickel carbonate to bring the bath to pH 5.0-5.5; then add 8 oz. per gal. of 100 volume H_2O_2, agitate for two or three hours and filter.

Impurities, such as copper, lead and selenium, can also be removed or "cemented" out by adding pure iron or nickel to the solution, then re-purified chemically to remove the dissolved iron.

Removing Organic Impurities

The oxidation of organics requires larger amounts of hydrogen peroxide and also potassium bichromate than for inorganic compounds. Care must be used when purifying bright nickel solutions not to destroy the necessary organics in the bath. One method is to heat the solution to 140 deg. F., add 1 to 2 oz. of activated carbon per gal., then 2 qts. of 100 volume hydrogen peroxide per 100 gal. of solution, all with constant agitation. Raise the pH of the solution to about 6.0 with nickel carbonate or

nickel hydrate. The time taken for such purification is generally from 16 to 24 hours, but it proceeds faster at higher temperatures.

For plating out impurities at low current densities not over 5 amp. per sq. ft. are required, using an auxiliary tank with large anodes and dummy cathodes. Agitate the solution. This method will also remove some organics.

The copper cyanide solution is amenable to such purification treatment, by which lead, thallium, cadmium, silver, zinc, nickel and tin can be removed. Carbonates can be precipitated with calcium sulphate. barium chloride, barium cyanide or by freezing, if desired. The recommended method is calcium sulfate at the rate of about 10 lb. per 100 gal. of solution, which will remove sodium carbonate at the rate of 1 oz. per gal.

The author also described the purification of other solutions such as acid copper, brass, cadmium, cyanide zinc, acid zinc and silver.

pH Value in Cyanide Baths

A. C. Gray, Electroplating Division, E. I. du Pont de Nemours & Co., Cleveland, outlined the measuremer , significance and control of pH i . cyanide plating baths. He claimed that the study of pH in cyanide plating baths, including various cadmium, copper, zinc and brass solutions, has shown the importance of controlling this factor since it has a marked effect on the operating characteristics of the baths and the quality of the deposit produced. A new, high alkaline glass electrode was found to be entirely satisfactory for pH measurements in cyanide solutions, and it represents the first practical and accurate method for pH control measurements in cyanide plating baths. The electrode is almost negligibly affected by sodium ions at high pH. The type E electrode has been developed for ranges up to pH 12 and 13.

Comparisons show good agreement between the hydrogen electrode and the high alkaline glass electrode—within plus or minus 0.1 pH unit. The high alkaline type glass electrode is stable in alkaline solutions. It is useful in the control of alkaline baths and titrations to determine caustic content.

Albert Hirsch, Snyder, Inc., Philadelphia, presented in a paper called "Advantages and objections to the salt spray test from an electroplating point of view," the practical plater's attitude, particularly as applied to production work in the manufacture of automobile parts, hardware, etc.

The advantage of the salt spray test is its usefulness as a comparator, its ability to expose defective plate and to distinguish between thick and thin deposits. For example, the salt spray showed up a hot dipped cadmium-zinc plate which lasted only 3 hr. against electroplated cadmium plate which lasted 100 hr.

The disadvantage of the salt spray lies in its poor correlation with exposure tests and life in service. The methods of applying the salt spray are not standardized and the results of the test vary with the position of the specimen in the box, with the concentration of sodium chloride, with the method of inspection and rating. The test is easily subject to misinterpretation by laymen and it seems to be impossible to get a quantitative unit for the measurement of corrosion. The author thought that it would be best to omit the salt spray test from specifications because of its unreliability and to rest on outdoor corrosion tests, at the same time keeping the plated articles in service clean.

Rubber Lined Tanks

Rubber lined equipment for the plating room was described by C. P. McHugh, Manhattan Rubber Division of Raybestos-Manhattan, Inc., Passaic, N. J. Because of the fact that it is chemically inert, rubber is an ideal material for plating tank linings and accessory equipment. Rubber tank linings are of several types: soft, semi-hard and combinations (in layers, double, triple and of the hard-and-soft "sandwich" type). Rubber lining may also be sprayed on. The best is hard rubber, compounded to retain some of its flexibility and bonded directly to the tank.

The author described the manufacture of compounded rubber sheet for tank linings, the method of application and bonding to tanks by hand work, testing the tank by the electric spark, and vulcanization or curing of the rubber.

Rubber tank linings are suitable for all plating solutions and all inorganic acids except the strongly oxidizing, such as nitric, chromic, sulphuric and hydrofluoric over 50 per cent. They are suitable for all alkalies and inorganic salts and many organic acids.

Some of the difficulties encountered with rubber tank linings may be listed thus:

(1) Contamination of solution by accelerators and anti-oxidants which may be used in the rubber, but which should not be present, at least in such form as to free themselves from the rubber.

(2) Softening or other attack by wetting agents, anti-pits, brighteners, etc. Before using any such addition agents, it is advisable to submit a sample to the manufacturer of the rubber lined tank to be used, for his approval.

(3) Plating out on the tank linings; rare but when it does happen, is due to defective installation, such as insufficient curing, etc.

"Removal of Chromium Contamination from Alkaline Plating Solution" was a paper presented by M. M. Beckwith, J. B. Ford Sales Co., Wyandotte, Mich., in which he said that one of the objectionable impurities in copper cyanide solution is the chromium in the hexavalent state as sodium chromate. If present in the proportion of 0.075 grams per liter, it will reduce the cathode efficiency to less than 2 per cent and also cause blistering of copper deposited from the copper cyanide strike, dulling of the subsequent bright nickel plate, streakiness, poor adherence, etc.

The objectionable chromium may be removed with sodium hydrosulphite—$Na_2S_2O_4$. The following equation shows the reaction of this material in changing chromium from the hexavalent to the trivalent:

$$2Na_2CrO_4 + 3Na_2S_2O_4 + 2NaOH + 2H_2O \rightarrow 6Na_2SO_3 + 2Cr(OH)_3$$

The trivalent chromium as a hydroxide appears as a precipitate if no Rochelle salts are present and may be filtered. In the presence of Rochelle salts, the trivalent chromium is mixed with the tartrate as a complex and will not be injurious so long as it remains in the trivalent state.

Sodium hydrosulphite is also satisfactory for removing chromium from cyanide zinc and cadmium solutions.

Radiant Heat Baking

One of the outstanding presentations of the meeting was a paper by Gustav Klinkenstein, Maas & Waldstein Co., Newark, N. J., on "The Uses and Limitations of Radiant Heat Baking Organic Fin-

ishes." It appears that infra-red baking was first applied commercially at the plant of the Ford Motor Co., Detroit, in about 1933. This company controls the patents of the process, but permits their use throughout the industry without restrictions.

Infra-red heat is applied by electric lamps generally arranged in a tunnel through which the product is carried on a conveyor. In other cases a portable bank of lamps is used and also individual lamps. The rays produced are "near infra-red" to distinguish them from the "far infra-red" rays used in convection ovens. The lamps are equipped with reflectors to concentrate the radiation on the work. Under these rays, the finish film comes up to the baking temperature in 1 to 2 min.

Visible light rays from violet to red, have a wave length of from 4000 to 7800 Angstrom units. The far infra-red rays may have wavelengths up to 120,000 Angstrom units. The near infra-red which is used for baking organic finishes, has a wave-length of from 7800 to 14,000 Angstrom units. In addition, certain types of lamps with enclosed reflectors use a band ranging from 7500 to 30,000 Angstrom units.

It has been considered in the past that radiant heat has no effect on the finish and the air which passes through its beams, but only on the metal which is heated. This conception is incorrect. Infra-red heating is generally used for opaque finishes which are not penetrable by radiant heat. Radiant heat is simply a new and very rapid method of applying heat and is suitable for certain classes of work, but unfitted for others. It should be compared with convection ovens for specific jobs to make a choice, but it will not completely supersede the oven.

The best conditions for radiant heat baking include:

(1) Low cost current.

(2) Heating equipment especially designed for the special product.

(3) Reduction of heat losses: (a) Radiation must strike the work; (b) must not be reflected from the work; and (c) must not be re-radiated at high temperatures. Also, heat must not be carried away by convection.

(4) Baking temperature should not exceed 600 deg. F.

(5) Quantity production is required for products similar in size, shape and finish.

Only those finishes which are hardenable in a short time by heat alone can be used. Oxidation hardening finishes, such as japans, are not suitable for radiant heat. Clear finishes on polished surfaces are unsuitable. Clear finishes on non-reflective surfaces are satisfactory. Certain finishes may char or burn yellow and certain enamels may wrinkle or get fatty edges in convection ovens, but perform satisfactorily under radiant heat. Finishes should be specially formulated for this type of heating.

The advantages of radiant heat baking are summarized thus:

(1) No long preliminary or heating up period is required. Generally, 10 min. will be sufficient for the baking job.

(2) It is suitable for conveyor operation.

(3) The baking equipment is simple, light and flexible and can be installed at any point in the conveyor line. It can also be set and removed at will, wherever sufficient length of travel is available.

(4) Space requirements are from 1/3 to 1/10 of convection ovens of similar capacity.

(5) The installation cost is low.

(6) The maintenance cost is low. Lamps last 5000 to 10,000 hours. Reflectors can be kept in good condition by cleaning once a month.

(7) The fire or explosion hazard is very low.

(8) Working conditions are good as there is little rise in the ambient temperature.

(9) The baking is uniform as the lamps may be set to eliminate shadows and avoid over-illuminated spots.

(10) The heat can be directed and confined to the desired zone giving a high heating efficiency.

(11) Improperly baked jobs are noticed at once and can be corrected.

(12) Baking conditions, once set at their best, can be rigidly maintained by keeping the voltage, speed of travel of work, air conditions, etc.

(13) Large surfaces baked by radiant heat had best be kept vertical for uniform heating. This is difficult in convection ovens.

(14) Massive products are also more easily handled by radiant heat than by convection ovens.

(15) No "case hardening" is experienced and no surface film interferes with the escape of the solvents.

(16) There is less chilling, wrinkling, crystallization or other form of reduction of gloss.

(17) The entire installation is highly flexible and finishing schedules can be easily changed.

For installation and operation the following factors must be considered: blacks absorb heat, are quick baking; whites reflect heat and are, therefore, slow. Solid products, such as, rods, spheres, massive pieces, etc., bake more slowly than sheet metal as the greater mass of the metal conducts heat away more rapidly.

Wrinkle finishes tend to flatten out under radiant heat rays and must be formulated specially for this type of baking.

Lamps emitting over 90 per cent of the energy input in the form of radiant heat rays, are available in 250, 500, 1000 watt sizes with separate reflectors. Gold plated reflectors reflect about 98 per cent of the radiant heat; oxidized aluminum, 75-91 per cent. Silver is an excellent reflector but its life is short because of its rapid tarnishing. A new coating for reflectors, which has attracted some attention, is vaporized aluminum which is said to have permanence, the ability to withstand temperature and reflectivity higher than that of gold under mean life conditions.

Clean, open reflectors may be maintained by wiping with cotton batting dipped in a proper thinner. Gold plated reflectors may be cleaned by dipping in a solution of caustic soda or 2 oz. trisodium phosphate per gal. of water, or 4 per cent hydrochloric acid; then rinse and polish lightly.

Reflectors may be set for convergent, divergent or parallel rays. Sealed lenses and reflectors are available for 1000 watt lamps and have improved and widened the scope of radiant heat baking.

Energy requirements are from 2 to 10 watts per sq. in. of work. Sheet steel painted black may be baked out at 280 deg. F. in 5 min. at about 2 watts per sq. in.; at 500 deg. F. in the same time by 6 watts per sq. in.

Higher wattages result in faster heating and higher efficiency. For that reason, high wattage is advisable at the entrance to the bak-

ing chamber, to raise the temperature quickly; and then to hold the temperature in the body of the oven at lower wattages.

Care must be taken to avoid drafts, losing efficiency by excessive convection. Of course, some vent is necessary to remove solvent vapors.

Cleaning of Cold Rolled Steel

E. H. Lyons, Jr., the Meaker Co., Chicago, described the rolling of steel to produce the new highly finished materials and then pointed out how the various lubricants used in cold rolling are removed prior to plating.

To remove saponifiable oils use an alkaline bath over 190 deg. F. Silicates are suitable provided their pH is not too high; also caustic soda. Silicates, phosphates and wetting agents reduce the time of cleaning.

For rapid work, electrocleaning is desirable at 60 to 100 amp. per sq. ft. Both anodic and cathodic cleaning are satisfactory, but the author recommended, in general, the anodic method. Excessive foam due to soap formation, may be kept down by the use of a small amount of kerosene. Small parts may be cleaned by tumbling and spray washing.

Paraffin and soluble oils may be cleaned by dipping or rinsing with warm water with the addition of a little soap. If these oils have been rolled in at the mill and annealed, much stronger cleaners are necessary and sometimes if the dirt is hard, or made up of decomposed organics, it is almost impossible to remove.

Degreasing before annealing saves considerable trouble in later cleaning. Another contaminant is the inhibitor used in pickling.

An electrolytic strip cleaning process has been developed to keep up with the four-high mill production. The following sequence is used for hot tinning: (1) Spray washing in warm, weakly alkaline solution, which removes most of the grease, (2) electrolytic cleaning cell, cathodic cleaning in hot alkaline solution at a current density of 50-60 amp. per sq. ft., (3) wringer rolls, (4) rinse tank, (5) dry and coil for annealing.

The total time for operations 1 to 5 above is 30 sec. at a speed of about 120-150 ft. per min. Speeds up to 300 ft. per min. of this cycle have worked satisfactorily. Since adding scrubbers and other improvements to the line, the above cycle has been speeded up to a rate of 2000 ft. per min., cutting down the total time involved in the cleaning cycle to 3 sec.

For cleaning cold rolled steel, a mixture is recommended composed of sodium orthosilicate or metasilicate of 3 to 4 oz. per gal.; sodium hydrate 8 to 10 oz. per gal.

The most important factor is the condition of the oil. If it is not decomposed it is easy to clean; if decomposed, it may be very difficult. If it is burned in, it may be impossible to clean without using a burn off flame or treating in fused sodium hydrate as the cathode, or annealing in molten lead. It is also possible to use cleaners based on solutions of emulsifying and deflocculating agents in kerosene or similar solvents in which the work may be soaked, rinsed, and then cleaned in an aqueous alkaline bath with current. Care must be exercised to keep the kerosene from dissolving some of the contaminants and contaminating other steel.

In cathodic cleaning, add a little zinc oxide dissolved in a high alkaline cleaner. A thin film of zinc deposits on the cleaned portions and the hydrogen evolution concentrates on the dirty portions of the work. The zinc is then dissolved in the pickle.

A strong anodic electropickling solution may be used (20 to 50 per cent sulphuric acid) and the electropickling and the alkaline electrocleaning cycle may be used but this procedure may be found slow.

Rectifiers for Electroplating

Copper oxide rectifiers for the electroplating industry were discussed by I. Albert Lee, General Electric Co., Bridgeport, Conn. The author described a rectifier with no moving parts except a cooling fan; in other words, an electronic valve which permits the current to go only one way and not to return or alternate as in a.c.

The rectifier element in the copper oxide type is a copper plate with a coat of red oxide and a top coat of reduced copper; then a nickel plate. A number of these plates are assembled into a stack and mounted into a casing with transformer, control device, blower, etc.

Comparing the operation of the rectifier with the motor generator set, the author summarizes: (1) output current is equal to that of the motor generator set; (2) rectifier is reliable and long-lived as there is no electrolytic action; (3) the operation is cool; (4) the efficiency is high as voltage is controlled by transformer taps and there is no need for tank rheostats or long bus lines as the rectifier is set at the tank; (5) the rectifier is made in standard sizes and design units and may be built up in any combination to any desired capacity.

In general, the copper oxide rectifier is recommended as a machine for doing the same job as the motor generator set, but more efficiently and at lower cost.

"The Effect of pH of Copper Cyanide Solutions on the Adhesion of Copper, Nickel and Chromium Finish on Die Castings," was the title of a paper presented by Martin F. Maher, Etched Products Corp., L. I. City, N. Y. Trouble often occurs such as blistering under color buffing of copper, or after nickel and chromium, or even later, in the baking of organic finishes on die castings. To eliminate such difficulties, care must be exercised not to overclean the work. Low concentration alkaline cleaners and short periods of immersion were advised.

A test run was made to determine the optimum pH on a number of parts treated identically except for pH, which was varied from 11.8 to 12.6, in steps of 0.4. Most blistering occurred on the parts plated at pH between 12.2 and 12.6. The optimum point was 9.4.

At lower pH, the copper solution was satisfactory but the deposits turned matte, or brick red. This was overcome by the use of sodium thiosulfate.

H. H. Uhlig, General Electric Co., Schenectady, N. Y., read a paper on Electropolishing based on a similar paper presented in October, 1940, at the meeting of the Electrochemical Society, on the use of a glycerine-phosphoric acid mixture for electrolytically polishing 18-8 stainless steel. Best conditions for polishing were determined by a photoelectric spectrophotometer. Best polish was obtained with an electrolyte of 42 per cent HP_3O_4; 47 per cent glycerine; 11 per cent H_2O by weight at 100 deg. C. or more, and 0.1 amp. per sq. in.

Other organic addition agents to phosphoric acid also produce good electrolytes. These substances are

generally high boiling materials containing one or more hydroxyl groups soluble in H_3PO_4. Nickel, copper, chromium steels (18-8) containing Mo and mild steel similar to 18-8 can be polished in such electrolytes.

Organic additions to H_3PO_4 have two effects: (1) change in electrolyte and anode phosphate film conductivity to produce optimum polish; (2) considerable retardation of localized pickling of anode by acid independent of anodic solution. Polishing of stainless steel is easier than iron.

Composition of Cathode Films

Abner Brenner, National Bureau of Standards, Washington, said in his presentation that cathode films may be investigated by the freezing method or by drainage of a flat plate cathode. It was found that the film at the cathode about 0.01 in. thick was markedly depleted in metal; that outside of this film existed a convection area in which metal circulated and that metal moved from convection area to the film by diffusion. The time of diffusion for the cathode film was found to be about 2 min., after which an equilibrium condition existed. Agitation reduces the thickness of the film and also results in less depletion of metal. Conversely agitation increases the proportion of sulphuric acid in the acid copper bath; and with agitation in the cyanide bath, cyanide increases while silver decreases in the cathode film.

"Electrocolor and Patternplate" was a paper by Dr. J. E. Starek, United Chromium, Inc., New York. The process described covers the electroplating of colors directly on a base metal; in other words, the production of final colors by electrolytic process. All colors of the visible spectrum are obtainable from one solution.

A variety of patterns may be obtained in different sizes and shapes; also from one solution. These patterns may be plated over with any other metal. Some of the above finishes, particularly the colors, are given a final coat of clear lacquer.

The color plates are called Electrocolor, the patterns, Patternplate.

The base metal is prepared by buffing, scratch-brushing, cleaning, etc., as usual. Copper or brass may take either Electrocolor or Patternplate directly. Other metals, such as steel, zinc, etc., are given a copper plate, then the Electrocolor or Patternplate. Two-tone or combination plates are easily obtainable.

The color plating is done in an alkaline organic cupric solution at ½ volt, 70-110 deg. F. (Deposition is faster at the higher temperatures.) Current density, ¼ to 3 amp. per sq. ft. A high cathode efficiency is obtained and it is possible to plate 0.001 in. per hr. The deposit which is a cuprous oxide, is rinsed, dried and clear lacquered.

The color of the plate depends upon the thickness and therefore, the time of plating. It is easily controllable as to thickness and uniformity. Throwing power is very high. Colors in the very thin plates are of the light interference type. The heavier plates give a pigmentary color which is thick, strong and will stand buffing.

Patternplate requires a basic deposit of copper. The pattern size depends upon the plating time; the longer the time, the larger the pattern. The bath is the same as used for color plating and the first deposit is cuprous oxide which is then reduced in certain areas to copper, starting from reduction nuclei. Various patterns are obtainable, such as crystal, fern, etc. Subsequent plating improves the corrosion resistance. The adherence of both Electrocolor and Patternplate is excellent, the work stands bending, forming, punching and shearing. Large areas are plated satisfactorily: 12 x 24 in. and 18 x 24 in., for example, on brass and steel. These sheets are blanked out into letter-box doors and other similar parts fabricated from the pre-finished metal.

Anodes are of electrolytic copper, and temperature is, of course, automatically controlled. A special ½ volt generator must be provided for this class of work. Solutions are not critical but can be maintained and need not be thrown away.

Copper Plating

F. F. Oplinger, E. I. du Pont de Nemours & Co., Wilmington, Del., discussed modern methods of copper plating. Copper cyanide solution was introduced about 1840. Later developments include the Rochelle salt solution and the present day high speed copper process developed by du Pont. The subject of copper plating is of particular interest at this time because of the general substitution of copper for much of the work formerly done by nickel.

The uses for copper plate include light deposits—0.0001 to 0.0003 in. as an undercoat for nickel; moderate coatings 0.0003 to 0.001 in. on steel before case hardening and in some instances in heavy thicknesses even up to 0.003 in.; heavy thicknesses—0.0006 to 0.002 in. on steel later buffed and covered with bright nickel; or in a cleaning and plating strike or flash applied before the regular copper and nickel deposit.

Copper may be deposited in good coatings on die castings prior to nickel plating. Good throwing power of copper solutions aids in the protection of the parts which nickel would not reach. With the aid of modern copper solutions, a routine can be established which shows considerable savings over past methods. Two of these routines are as follows:

A (1) Polish and color buff
(2) Copper plate — 0.0005 to 0.001 in.
(3) Bright nickel—0.0003 to 0.0005 in.
(4) Chromium plate.

B (1) Polish
(2) Copper plate heavily—0.0015 in.
(3) Copper buff
(4) Copper plate light—0.0005 in.
(5) Bright nickel plate
(6) Chromium plate.

Routine B provides a highly rust resistant finish.

Modern high speed solutions have increased production greatly without the need for new equipment. The deposits are uniform, adherent and the coatings have a good, if not a high luster even in heavy thicknesses. The anodes consist of cathode copper sheet, kept clean and bright and the solutions are easily controllable. Perfect cleaning is necessary and the anodic type is recommended.

It is best to use a strike solution with carefully controlled cyanide content. Filtering with activated carbon is necessary to keep the solution free of organic and inorganic impurities. Use soft water.

Circulate the solution mechanically around the anodes as well as the work. (Air should not be used.) Current densities above 20 to 25 amp. per sq. ft. result in excessive

(CONCLUDED ON PAGE 92)

How to Harden

TOOL STEELS

As a continuation of last week's practical classification of tool steels, the author herein details many useful practices for the successful hardening of the various types of tool steels. Of particular value is the chart summarizing the preferred hardening procedures.

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THERE is sufficient information to make the art of tool hardening a science; however, this information can only be used insofar as it helps to explain the best practical method for hardening tools. Like most other discoveries, the best methods for hardening tools were discovered first and the scientific explanation came later. Since tool hardening departments bear very little resemblance from one plant to another, no attempt will be made to put tool hardening on a scientific basis. Yet a standard will be set up that can be attained or approached in any plant.

Tool hardening technique is determined by many conditions. It should not be said that the best method for tool hardening is to heat the tool rapidly or to heat the tool slowly with careful preheating, for the type of furnace, furnace atmosphere, characteristics of the steel, etc., must be considered. Therefore, definite rules are not tabulated. Many men with all sorts of equipment are doing good tool hardening, and the art is quite easy to understand. On the other hand, correct methods for hardening tool steels can best be brought out through a discussion of the hardening of the steels listed last week in the article on tool steel classification. In this way any rules that are stated will be correlated in the complete hardening technique.

Hardening the brine hardening tool steels: The hardening of steels Nos. 1, 2 and 3 (1.2 per cent carbon steel for rubbing wear; 1.05 carbon, plain carbon tool steel; and the 0.90 carbon 0.25 vanadium shock steel) is very similar and will be covered as one steel. This is one of the advantages of this particular combination of brine hardening tool steels. These steels should all be hardened from 1450 deg. to 1460 deg. F. The depth of hardening can be increased by raising the heating temperature and growing coarse grains; however, it is more desirable to use tough, fine grained steels. Increased depth of hardening is better obtained with increased alloy content and retaining a fine grained steel. Usually, the deeper hardening steels are oil hardening, for the risk of breakage in hardening increases with the depth of hardening with brine hardening steels. From 1450 deg. F. these steels will harden approximately ¼ in. deep fully hard. The next 1/16 in. to ⅛ in. of depth will gradually decrease in hardness down to the core hardness which is approximately Rockwell C-35 to 45, which is still very hard and strong.

Another point to be considered in selecting 1450 to 1460 deg. F. for the hardening temperature instead of a wider range to vary with the size of the tool is the solution of the alloying element in the steel. For example, steel No. 1 (1.2 C) is being hardened 250 deg. F. below the temperature for complete solution of the iron carbide in the iron. This leaves considerable iron carbide undissolved in the steel, which acts like thousands of little diamonds imbedded in the steel to increase its ability to hold a sharp cutting edge and resist rubbing wear. By using one hardening temperature the same amount of solution will always be attained and the steel will give uniform results.

Uniform heating of steels Nos. 1, 2 and 3 at 1450 deg. F. is very important; however, poor heating does not show up in the finished tools, for brine hardening steels warp and change size, anyway. Good heating will decrease the hardening strains, warpage and the tendency to crack in hardening. At 1450 deg. F. the rate of heat transfer is slow enough so that considerable temperature difference can be found in commercial tool hardening furnaces. Salt baths give the most uniform heating at this temperature. Box type hearth and muffle furnaces are entirely satisfactory at 1450 deg. F. For these types of furnaces there is a general rule for uniform heating that the hearth should be at least three times as wide as the tool to be hardened. There are some types of tool hardening furnaces that do not heat uniformly at 1450 deg. F. The disadvantages of non-uniform heating are learned when oil hardening steels are hardened from the 1450 deg. range, which will be discussed later.

Slow heating or rapid heating—no other factor in tool hardening is so dependent upon the furnace and atmosphere. If the tool is in a furnace with air for an atmosphere, the tool should be put into the furnace at the proper hardening temperature and brought to temperature as quickly as possible, soaked at heat for 5 to 10 min. and quenched immediately. (Steels Nos. 1, 2 and 3 may all be hardened in this manner.) A light scale is formed which throws off in the quench leaving a clean white tool free from scale or any sign of pitting. Slow heating or preheating in air will produce heavy scale, pitting and decarburization. With a

protective atmosphere of the oxidizing type the same procedure may be followed with good results and again the tool should not be soaked over 5 or 10 min. at heat or heavy scaling and pitting will result. Also, a second method is open: The tool may be heated to 600 deg. F. in a draw furnace, preheated to 1250 deg. F. to 1300 deg. F. in the tool hardening furnace producing a very protective form of scale, then brought up with the furnace to 1450 deg. F. and soaked up to 1 hr. if desired before hardening. Clean, hard, pit-free work will be produced. A third type of atmosphere is the slightly carburizing and the neutral atmospheres. These atmospheres are usually contained in very tight furnaces to prevent infiltration of air, and often there is no means to observe the work coming up to temperature which makes it difficult to tell when a tool is up to heat; this is a distinct disadvantage. A good rule to follow in that case is to allow 1 hr. for each inch of thickness plus about 20 min. With these atmospheres the tool may be heated slowly with preheating for uniform heating or may be brought right up to the hardening temperature, and the length of the soak has very little effect on the surface of the tool. When the tools are removed from these furnaces a very thin scale is formed on the tool which throws off in the quench; thus hard, clean tools are obtained.

In a salt bath a tool will heat much more rapidly than with any other means of heating. It is interesting to note that in their tool steel catalogs most tool steel manufacturers recommend slow heating. One and maybe more recommends rapid heating; another, which is one of the largest steel companies, says all grades should be heated slowly and uniformly and later on suggests that immersion (rapid) heating is desirable for tool hardening, which is a consideration. With a salt bath at the hardening heat of 1450 deg. F., it requires about 6 min. per in. of thickness to bring a tool up to the temperature of the salt. Ten minutes should be added to allow for all of the solution of alloy that will take place at that temperature and to obtain a uniform temperature throughout the piece. With salt baths, the best uniformity of heating is obtained. Preheating may be used, heating the tool through at 1250 deg. F. and then bringing the tool up to 1450 deg. F. with the furnace, but this is not needed for uniform heating. When the tool is removed from the salt bath, a layer of salt clinging to the tool protects it from the air and gives the cleanest tool hardening possible at 1450 deg. F. Also, the tool may be raised out of the salt bath to check the heating rate given above, for the salt protects the tools from oxidation.

There are two types of salt bath, neutral or active. At 1450 deg. F. straight cyanide operates much more satisfactorily than any other type of bath; however, for tool hardening care must be taken to keep the bath active by making regular additions. During the short tool heating time, active salt baths change the chemical composition of the surface of the tool 0.001 in to 0.002 in. deep, resulting in a slightly harder surface which is often an advantage. Neutral salts are very hard to keep neutral and are often found to be decarburizing.

Quenching—The most important part of tool hardening is the quenching. The proper hardening temperature can be obtained by setting a dial, but quenching is a hand operation and is an accomplishment of skill. After removing a brine hardening tool from the furnace, there is no need for a grand rush to the quench tank. When the tool is thrust into the brine (10 per cent), it should be agitated as vigorously as possible to keep any air or steam bubbles from collecting on the tool. The tool should be agitated for 6 to 8 sec. per in. of cross-section, then the tool should be removed from the brine and cooled in oil. In the oil, the tool should remain stationary until the oil will not smoke when the tool is removed.

The next step is to wash the oil off in a hot water tank. The water need not be boiling, but should be about 200 deg. F., almost boiling or steaming. This gives a check on the preceding operation, for although the tool is far too hot to handle when it leaves the oil, it should not cause any boiling of the hot water. The tool should be left in the hot water a few minutes to let the temperature equalize, and

TABLE III
Tool Hardening Guide

A considerable amount of the information in this article can be listed in chart form. The chart is helpful for tool hardening and to show the similarity of hardening practice for many of the steels shown in the tool steel classification last week. However, it must be remembered that all of the tool hardening technique cannot be summed up in a one-page chart. The brine hardening steels, especially No. 3, can be oil quenched from a slightly higher temperature and drawn at about 1000 deg. F. for tough high strength parts.

Steel No.	Hardening Temperature, Deg. F.	Quenching Medium	Drawing Temperature, Deg. F.	Rockwell C Hardness	Comment
1	1460	Brine	300	65	Low draw needed for long wear (grind with care).
2	1460	Brine	350	63.5	For best results with permanently alined tools.
3	1460	Brine	350	62	For increased toughness.
			550	58	For maximum toughness.
4	1750 to 1800	Oil	350	63	For greatest wear.
			400	62	For increased toughness.
5	1460	Oil	350	62	For best results with permanently alined tools.
6	1460	Oil	350	60	Greatest toughness in an oil hardening steel.
7	2200	Oil or air blast	1050	62	For die parts.
	2350	Oil or air blast	1050	65	For cutting tools.
8	Cyanide at 1500. Carburize, then Reheat to	Oil	No draw	File hard surface	(Minimum size change)
	1460	Brine	No draw	67	For gages (grind with care)
	1460	Brine	350	62	For other tools

then it should be put right into the draw furnace still far too hot to handle. The results will be the hardest possible tools with a minimum chance of breakage. The explanation is quite obvious. Sufficient time is allowed in the oil between 200 deg. and 300 deg. F. for practically all of the austenite to transform to hard martensite giving maximum hardness. Also, there is less chance for breakage by slow cooling in oil while the transformation is actually taking place. The reason for the rapid quenching from the hardening heat to about 300 deg. F. may be found in the S curves. This information cannot be repeated here, but can be found in the references listed at the end of the paper. It doesn't matter whether the piece is ¼ in. thick or 6 in. thick, the above procedure should be followed. There is no need to hurry. Only during the actual brine quenching the tool should be agitated as vigorously as possible, yet the timing should be accurate by one method or another. The rest of the quench should be slow, careful and deliberate. The tool should not be left in the oil to be forgotten. If the tool is only 1/32 in. thick, it is well to set a cup of quenching medium near the door of the furnace. If the tool must be cooled to room temperature before drawing for a check of hardness or other reason, the tool should be left motionless in the oil until it is cool. The easiest way to break a tool is to cool slowly at first, say motionless in water, and then vigorously down to room temperature.

One of the big advantages of the brine hardening tool steels over the oil hardening steels, is the ability to harden part of the tool and strengthen the remainder. If only the top of a punch needs to be C-63 hardness and the remainder might better be about C-40 for strength and toughness, the top of the punch can be quenched in brine for the proper length of time and then the whole punch quenched in oil. However, as a word of caution, leaving half of the tool in the brine too long will break the tool. Many difficult sections made of brine hardening steel may be avoided by just hardening the part of the tool that needs to be hard. Also, many parts of tools such as heels on punches and pads will not break off at C-30 to C-40. Hardening the punch all over and drawing on a hot plate leaves the wheel of the punch about C-55, and it is very apt to break off if it is thin. Partial quenching is limited to the brine hardening tool steels. To immerse an oil hardening tool half way into the oil will keep the oil burning and might set the entire surface on fire. After hardening the end of the tool there is no slower cooling medium in which to cool the remainder of the tool; therefore, oil hardening steels are very likely to break if an attempt is made to harden part of the tool. Since the oil hardening steels gain very little in strength and toughness by blueing them on a hot plate, the combination of hardness and toughness in a single piece of steel is best obtained in the brine hardening steels.

TOOL hardening from liquid baths gives the most uniform heating and cleanest tool hardening in the 1450 deg. F. temperature range.

Drawing the water hardening tool steels—in Table I, showing classifications of tool steels, the proper hardness for each steel was given. These values are obtained with a 350 deg. F. draw in most cases, which makes it possible to draw different steels and tools at the same time in the same furnace. One exception is steel No. 1, which should be drawn at 300 deg. F. to retain maximum hardness. Steel No. 2 is drawn at 350 deg. F., and steel No. 3 is drawn at 350 deg. F. to obtain the higher hardness and at 550 deg. F. to obtain maximum toughness. The usual practice is to draw 1 hr. per in. of cross-section. As the cross-section increases and the time is increased, a slightly lower temperature may be required to obtain the same hardness. With the water hardening steels, considerable strength and toughness are gained as the drawing temperature is raised. This is useful for hand tools and some of the rough work tools such as power driven screw drivers. After brine quenching, these tools may be drawn as high as 1000 deg. F., the exact hardness from C-40 to C-54 being determined for each application.

Dies for cold swaging a hard material such as drill rod speedometer spindles may be drawn as little as 1 hr. in boiling water. For the majority of tools that are held rigidly in die shoes or other holders and that are always in perfect alinement, the hardness given in the classification is the best hardness for each particular steel. Since little austenite is retained in hardening the brine hardening steels when using the quenching method described, the blue brittle range is of little importance with these steels. Drawing temperatures throughout this range are listed in tool steel catalogues for hand tools. With the oil hardening steel, the transformation in quenching cannot be slowed down enough to prevent the retention of considerable austenite. So, on drawing these steels from 425 deg. to 700 deg. F., the transformation at the remaining austenite prevents any increase in toughness even though the hardness decreases. As has been mentioned before, there is little or no gain in blueing the

backs of punches made of oil hardening steels.

There are a few tricks that may be used in tool hardening. One is to make a uniform section out of a bad section that is very likely to break. Most tool breakage in hardening is the result of simple expansion and contraction on heating and cooling. A thin section adjoining a heavy section cools and hardens much more rapidly than a heavy section. The contraction of the cold, hard section hot works the soft hot section, thus establishing equilibrium. When the large section cools off and contracts, it cold works the small hard section, thus breaking the tool. If the change in section may be made gradual by fillets, wire, bolts in holes near edges, wiring steel wool into sharp corners, there will be no point of stress concentration and breakage will be eliminated. Obviously, this also applies to the oil hardening tool steel.

Another trick that is also used with the brine hardening steels Nos. 1, 2 and 3 to prevent breakage with the most difficult section, is to heat the tool for hardening in the usual way. After the tool has soaked for the proper length of time, the furnace and tool are cooled to 1350 deg. F. When the temperature of the furnace reaches 1350 deg. F. the tool is immediately quenched by the method previously described. Brine hardening tools that can be hardened by no other method may be successfully hardened in this way. There is no loss in hardness or quality of the tool, although a protective atmosphere is needed to prevent oxidation of the tool.

Hardening the oil hardening tool steel: Steel No. 4, high-carbon high-chrome, is the only all-around tool steel in this classification that requires special hardening technique. With 12 per cent chromium and 2.5 per cent carbon, considerable iron and chromium carbide is formed to give this steel its extreme cutting ability for blanking dies, etc. The proper hardening temperature varies from 1750 deg. F. to 1800 deg. F. depending upon the type of furnace and the method of hardenings. At 1750 deg. F., the rate of heat transfer is very rapid, so that there need be very little thought about uniform heating in any of the tool hardening furnaces. Also at this high temperature, the rate of decarburization is much more rapid than at 1450 deg. F., and a highly protective atmosphere is needed or else the tool should be packed in clean cast iron chips or spent carburizing compound. If the tool is not heated to 1750 deg. F., insufficient carbide is taken into solution to give complete hardening of this steel. If the tool is heated above 1825 deg. F., too much alloy is taken into solution and considerable austenite will be retained upon quenching, resulting in a soft tool. For this reason it is more difficult to harden a perforator of steel No. 4 in a gas flame or other uncontrolled heating medium than carbon tool steel.

There are a few furnace atmospheres that will protect high carbon high chromium steel at its high hardening temperatures, namely, vaporized oil, natural gas, charcoal generator gas, and ammonia generator gas. These atmospheres are contained in tightly sealed furnaces and it is difficult or impossible to watch the tool come up to heat. Therefore, this steel should be heated 1 hr. for each in. of thickness.

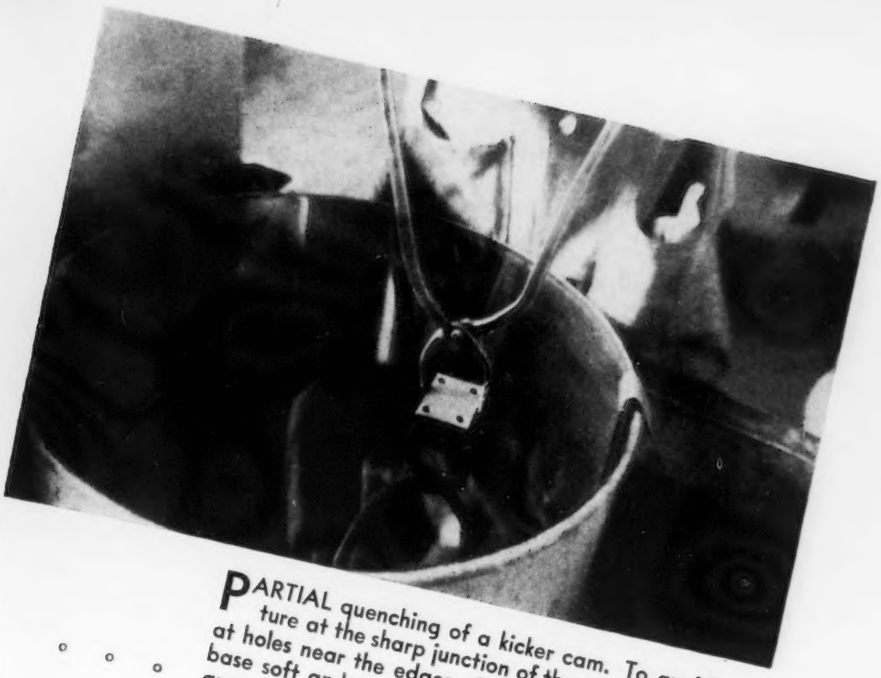
One of the features of steel No. 4 is its non-deforming properties on hardening. The most intricate tool of steel No. 4 may be put into a furnace at 1750 deg. F. and hardened without the slightest size change, again indicating that uniform heating throughout the piece just before quenching is more important than slow heating.

QUENCHING stresses at sharp corners may easily be distributed over a sufficiently large area to prevent breakage by filling the corner with wire.

If a protective atmosphere is not available, high-carbon high-chromium tool steel may be packed in spent carburizing compound or clean cast iron chips to protect the tool during hardening. In this case much more care needs to be taken to see that the pyrometer indicates the true temperature of the tool which is not too difficult at the high temperature of 1750 deg. F. to 1800 deg. F. Also 1 hr. per in. of thickness of the container must be allowed to heat the tool through.

Quenching — The quenching of steel No. 4 is very simple. The tool should be agitated until the oil vapor bubbles stop appearing on the surface and then the tool should remain stationary in the oil until there is no sign of smoking when the tool is removed from the oil. The tool should be washed in the water that is almost boiling. If the tool is put into the hot water too soon and boils (the water), it is very likely to break. The tool should remain in the water a few minutes to equalize in temperature and then put right into the draw furnace still far too hot to handle.

Drawing—It is easy to state the best drawing technique for high-carbon high-chromium tool steel. Draw at 350 deg. F. 1 hr. for each in. of thickness. For maximum toughness draw at 400 deg. F. for 4 hr. for each in. of thickness. As has been mentioned before, there is no practical gain in toughness by drawing the oil hardening tool steels included in this classification



PARTIAL quenching of a kicker cam. To avoid fracture at the sharp junction of the cam and base and at holes near the edges of the piece, and to keep the base soft and tough, requires a high degree of skill to quench part of the tool in brine and the remainder in oil.

at any higher temperature than 400 deg. F. This is due to the retention of austenite by the alloying element which transforms upon heating above 450 deg. F. and possibly due to further precipitation of the alloy as the drawing temperature is increased. Thus steel No. 4 gains only slightly in toughness at 1100 deg. F. with a hardness of C-44, over drawing at 400 deg. F. with a hardness of C-63, and there is no gain in toughness between these two temperatures. Even in the annealed condition this steel is very brittle compared with any steel that is really tough.

Before leaving the high-carbon high-chromium tool steels, the air hardening grade with approximately 1 per cent molybdenum should be recalled, for the toughness of this type is usually double that of the oil hardening types, due to the decrease in internal strains of air quenching in place of oil quenching. Again practically and technically, there is no increase in toughness in drawing the air hardening type above 400 deg. F. although this steel shows secondary hardening at 950 deg. F. There is a tendency for this steel to decarburize on the surface during air quenching, and it is very difficult to remove decarburization from all of the surfaces of cutting dies for which high-carbon high-chromium steel is mainly used. Present developments in hardening furnaces having a cooling chamber adjacent to the heating chamber and provided with protective atmosphere overcomes this disadvantage of decarburizing in quenching. The heads of perforators made of steel No. 4 may be softened by heating in a gas flame to a red heat, softening the steel to C-35 to C-40, and the air hardening grade may be softened to C-50 to C-55 by the same method.

Oil hardening manganese die steel—Steel No. 5 is much like the brine hardening tool steels. The proper hardening temperature is 1450 deg. to 1460 deg. F. In most instances, the reasons for using this steel in place of the brine hardening steels is to eliminate warpage or size change or hardening cracks. Non-uniform heating will defeat both of these conditions with oil hardening die steel. For this reason the best results are obtained by heating steel No. 4 in a salt bath. In quenching, the same rule is followed as in brine hardening steels except that the tool is quenched in oil. The tool should be agitated for 6 to 8 sec. per in. of thickness and then allowed to remain stationary in the oil (while brine hardening steels may be transferred to oil at this point for a slower cooling rate, there is no other material that can be used to slow down the cooling rate of oil hardening steel).

Continued agitation of steel No. 5 in oil until it is stone cold is very likely to cause breakage. The tool should remain stationary in the oil until it is just below 212 deg. F. This is easily determined by the failure to see any smoke or oil vapor rise from the tool when it is removed from the oil. The tool should be washed in steaming water at 200 deg. F. which gives a further check on the hardening technique for no steam bubbles should form on the tool when it is immersed in the hot water. After washing the tool and leaving it in the hot water long enough to allow the temperature to equalize, the tool should be put right into the draw furnace at the proper drawing temperature. Warning: the tool should not be left in the oil to cool while attending some other work, for a forgotten tool in the quench is very apt to break. Stay with the tool until it is in the draw furnace.

It may seem that so much talk about breakage of oil hardening steels is not warranted, but in practice among tool hardeners that know what they are doing, there is more breakage of oil hardening tools than brine hardening tools. If the tool must be cooled to room temperature for a check of the hardness before it is drawn, let it remain stationary in the oil, do not try to hurry the cooling at this point or breakage is very likely to occur. The major reason for breakage of tools, as previously discussed under brine hardening steels, also applies to oil hardening steel. The slower transformation rate of the oil hardening steels does not entirely correct this evil. Thus, if a die block is made up of ⅛ in. and 1 in. section joined with sharp corners and such that the quenching medium may easily attack all surfaces, steel wool or other material should be wired into the corner to distribute the stress. There will be no loss of hardness and the tool will not break.

Like the other steels, the oil hardening die steels should be drawn at 350 deg. F. When maximum hardness is desired, steel No. 5 may be drawn as low as 300 deg. F. There is no gain in shock strength for the oil hardening die steels in the range of 400 deg. to 650 deg. F. The exact temperatures vary slightly with the different analysis or brands.

Some form of protective atmosphere is needed for hardening steel

No. 5, for in air it scales and decarburizes very rapidly.

Steel No. 6 should be hardened, drawn, etc., the same as steel No. 5, the only difference being in the hardness obtained, due to the analysis and characteristics of the steel.

High speed steel No. 7 (the 18-4-1 type) is hardened much the same as the other oil hardening tool steels. When the proper equipment is available, it is perhaps, mechanically, the easiest of all tool steels to harden, yet when it is realized that this steel is being hardened from a temperature where all of the other steels in the classification would melt, the proper care will be exercised in hardening. A very highly protective atmosphere is needed for hardening high speed steel, of which there are so many different types that they cannot be discussed here. The tool should be preheated to approximately 1650 deg. F., then transferred to the high heat furnace at 2350 deg. F. At this high temperature, the tool comes to heat very rapidly and should be quenched within a minute after reaching the furnace temperature.

High speed steel should be quenched like the other oil hardening steels except that it should be agitated slightly longer due to the greater quantity of heat stored in the steel to keep oil vapor bubbles from collecting on the tool. The tool should be put in the draw at 1050 deg. F. (the drawing temperature) or at 350 deg. F. until a 1050 deg. F. draw is available. A second draw at 1050 deg. F., after cooling slowly to room temperature, slightly increases the toughness of high speed steel due to further transformation as the tool cools to room temperature from 1050 deg. F. This procedure should give a hardness of C-65 for cutting tools such as form cutters.

When this steel is used for hot die work and greater toughness is needed, there are two methods of increasing the toughness. First, the tool may be hardened from 2350 deg. F. and then drawn high at 1200 deg. F. to C-60 or C-62; however, the rapid softening of high speed steel above 1200 deg. F. makes this method difficult to control especially when numerous brands of high speed steel are involved. Second, the tool may be hardened from a lower temperature, 2200 deg. F., and drawn at the usual drawing temperature, 1050 deg. F., to C-61 or C-62 with very accurate results and increased toughness.

There are other methods of hardening high speed steel that deserve mention; one is a patented carbonaceous block that gives off a strongly protective atmosphere when it is hot. Small high speed tools are hardened very nicely from these blocks. The care that must be exercised in hardening high speed steel is well illustrated by the fact that if the tool comes in contact with a carbonaceous block, it will dissolve carbon from the block, which will lower the melting point of the steel and melt the surface of the tool. No preheating is used in this process.

Another method in widespread use is hardening high speed steel in salt baths. The high temperature of 2350 deg. F. for hardening the 18-4-1 type of high speed steel is too destructive of the furnace to use salt baths for this type of steel. For the molybdenum type of high speed steel that hardens from 2150 deg. to 2200 deg. F. salt baths operate satisfactorily and provide the extra protection from decarburization needed for this type of steel. Hardening high speed steel tools from salt baths is very easy; however, keeping the baths in working order to prevent decarburization requires considerable skill and experience.

Hardening the low carbon machine steels—Steel No. 8 is used in four different conditions: (1) As received or soft; (2) cyanided or light cased; (3) carburized hardened and not drawn; and (4) carburized hardened and drawn. In the first case (1) any heating and quenching of this low carbon steel will decrease its hardness and strength below its cold rolled or cold drawn condition except in sizes under ⅛-in. rounds. Therefore, this steel is not heat treated for increased strength. It can (2), however, be case hardened in cyanide or other light case hardening medium. Approximately 0.003 in. case is obtained in 1 hr. at 1500 deg. F. and 0.009 in. in 3 hr. with an oil quench and very little distortion using modern steels. This case is very hard, is not drawn and is satisfactory for many applications involving rubbing wear. Increasing the hardening temperature and brine quenching both increases the depth of hardness and distortion and sometimes increases the surface hardness on large pieces. As regards a heavier case (3), from 1/16 in. to ⅛ in. is easily obtained by either pack, gas or liquid carburizing. For deeper hardening than ⅛ in. it is better to use one of the other tool steels. After carburizing, the tool must be brine quenched to harden, for a plain carbon case is obtained. Tools are carburized at 1650 deg. to 1700 deg. F. The best structure is obtained by oil or air cooling from the carburizing heat and then reheating to 1450 deg. F. for hardening (4). From there on the tool should be handled and treated like brine hardening tool steel except that there is less chance of breakage in hardening. If the tool is pack carburized and the boxes air cooled after carburizing, good results are obtained by hardening from 1450 deg. F. Tools such as gages that are subject to very little strain may be used in the fully hardened condition. Tools subject to pounding should be drawn at 350 deg. F. If it is desired to use the tool without drawing, the tool must be ground very carefully.

Much of the information detailed herein is summarized in Table III, which is helpful for tool hardening and shows the similarity of hardening practice for many of the steels shown in last week's steel classification.

References

The first three references give information on the S curves and some explanation for the rapid quench at the start of the quenching cycle and the slow quench at the end of the quenching cycle.

(1) "The Process and Result of Austenite Transformation at Constant Temperature," Metals and Alloys, January 1937.

(2) "Transformation of Austenite at Constant Subcritical Temperatures," by E. S. Davenport and E. C. Bain, Transactions of the American Institute of Mining and Metallurgical Engineers, Iron and Steel Division, 1930, pp. 117-154.

(3) "Microscopic Cracks in Hardened Steel, Their Effect and Elimination," by E. S. Davenport, E. L. Roff and E. C. Bain, Transactions of the American Society for Metals, 1934, p. 289.

Further information on tool steels and tool hardening may be found in the tool steel manufacturers' catalogs and metallurgical bulletins and in the following books and articles:

"Tool Steels," by James P. Gill, 136 pages.

"Tool Steel Simplified," by Frank R. Palmer, 316 pages. First edition 1937.

"Metals Handbook," American Society for Metals, approximately 100 pages on tool steels, 1939 edition.

"Choice of Tool Steels According to Their Wear Toughness," by Harold B. Chambers, Metal Progress, June 1940.

"Purchase and Inspection of Tool Steels," by Samuel C. Spalding, Metal Progress, June 1938.

"Toughness Particularly of Tool Steel," Metal Progress, April 1940.

"Steel Standardization," by A. L. Hartley, Sept. 14 and Sept. 21, 1940, THE IRON AGE.

"Free License Offered on D.B.L. High Speed Steel," THE IRON AGE, March 13, 1941.

"High Speed Steel," by H. W. Pinder, THE IRON AGE, March 27 and April 3, 1941.

Shell Production by the Witter Process

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WHEN the Assel cross-roll and elongator mill for processing mechanical tubing was designed and constructed eight years ago by the Timken Roller Bearing Co., no thought was given that it would some day rapidly produce shell forgings for the United States and Great Britain. Yet today the Witter shell forging process of Salem Engineering Co., which utilizes the Assel mill, is being used by two large companies in the Pittsburgh district to produce large quantities of shell forgings. Furthermore, two mills are in process of construction and contracts for numerous others are pending.

The first Assel mill was designed and built at Canton, Ohio, during 1933 and 1934 and was used in conjunction with piercing mill and regular tube mill equipment operating at the Wooster plant of the Timken Steel & Tube division. On March 3, 1935, the first complete Assel mill started production of 2½ in. o.d. x ¼ in. wall mechanical tubing. Hence the original mill, which utilizes three humped rolls in the manufacture of tubing, is not very old and the Witter process, an adaptation of this method for rolling closed end tubular products, is a comparative youngster already showing signs of unusual strength, according to production figures.

Consequently, a proven unit was utilized and with the addition of mandrel handling and sizing equipment, the processing of closed end projectiles, such as shell forgings, was realized.

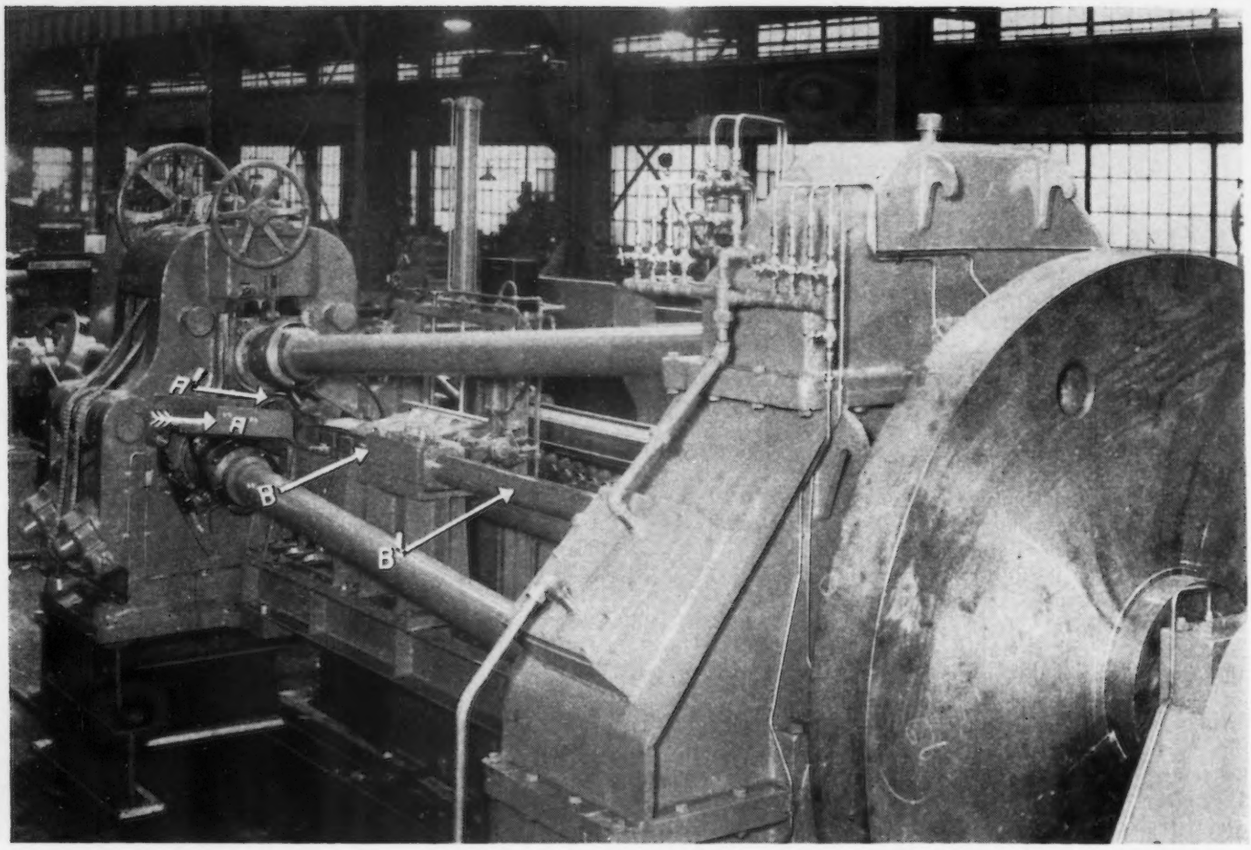
Shell forgings were being produced in experimental mills during 1940 and the first Witter process mill began producing shells at a Pittsburgh district plant on Jan. 10, 1941. This company is operating three Witter process units and a larger unit is being installed at the present time. The existing mills are producing shell forgings ranging from 75 mm. to 5 in. anti-aircraft, while the larger unit will produce forgings ranging from 105 mm. to 7 in. Another Witter process unit is making 75 mm. shell forgings at a plant in the Pittsburgh district.

A brief description of the operation of the Witter process follows: Billet steel is properly upset, forged, or pressed to form the pierced blank. This blank is conveyed to a loading station of the finishing mill where it enters the breakdown pass of the humped rolls with a smoothly machined mandrel inserted in the cavity of the pierced blank. The mandrel is kept bottomed in the blank by pressure from a pushing cylinder during the breakdown, elongating and cross rolling operations. On elongating, the metal wraps tightly on the mandrel as it passes through the humped rolls, thus producing a smooth and uniform cavity in the shell forging. After leaving the rolls, the forging is sized with mandrel still inserted and then the mandrel is automatically stripped, leaving the shell forging completed and ready for machining operations elsewhere. Ten or more mandrels are continuously in use in the automatic cycle and are properly cooled, thus assuring a uniform production of shell forgings.

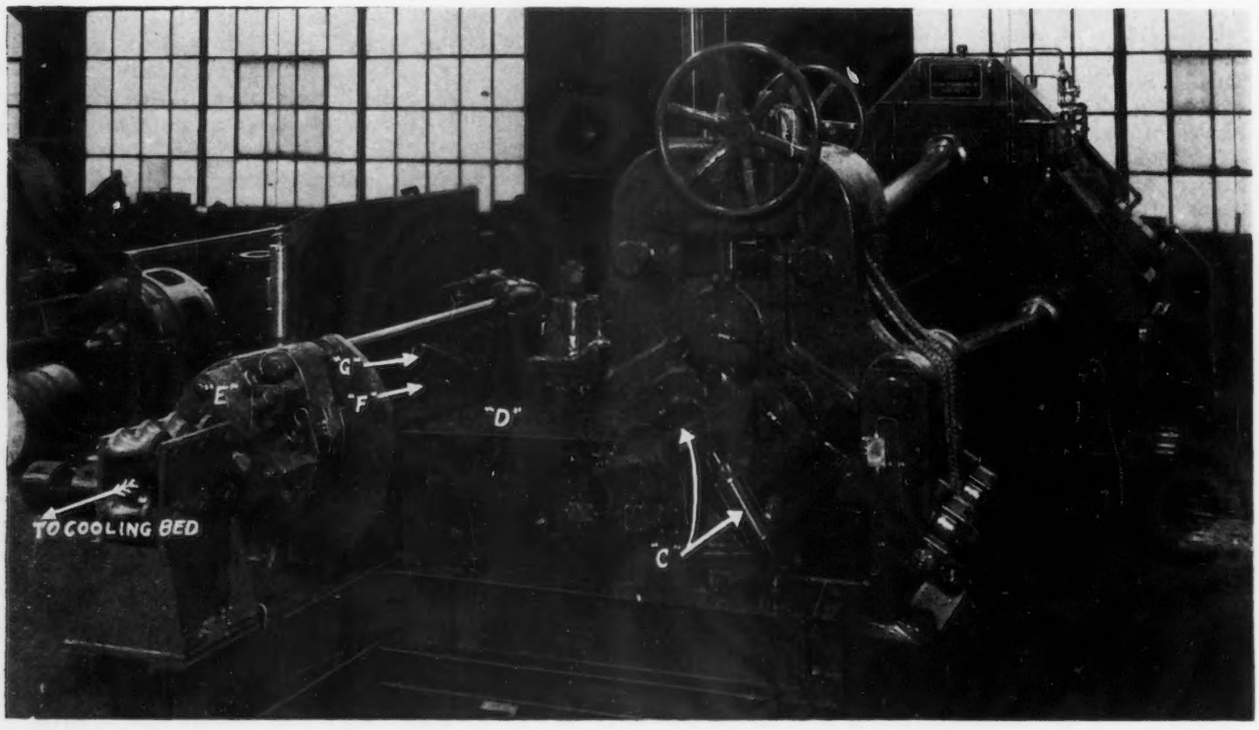
Although the Salem Engineering Co. originally set up an estimated unit production of 280 75 mm. shell forgings an hour, numerous hourly runs of over 300 and some eight-hour turn productions of approximately 2000, and 24-hour day productions of 5600 have been realized. Short runs on 75's have been as high as 7 per min. and productive

PIERCED 75 mm. shell blank forging made for the Witter process —forged in two operations under drop forge hammers.

ETCHED section of shell as rerolled by Witter process from upset forging.



VIEW of three roll Assel mill used in Witter process with important parts indicated. *A*—Inclined reciving chute for pierced blanks direct from turret press including guide cannon *A'* for entering breakdown pass of rolls. *B*—Stub mandrel in centered position for entering pierced blank (10 mandrels are rotated in sequence). *B'*—Pressure cylinder to keep mandrel bottomed in blank cavity during the rolling operation.



DISCHARGE end of Assel mill. *C*—Receiving cradle for cross rolled shell—with stub mandrel inserted—and tilting cylinder to deliver shell and mandrel to gravity conveyor. *D*—Inclined conveyor for delivering rolled shell into position for final o.d. sizing operation. *E*—Sizing head assembly—suitable for using either two sets of rolls or draw rings as preferred. *F*—Sizing plunger head. *G*—Automatic clamp for stripping the mandrel attached to sizing cylinder ram.

averages deducting lost time have been about 275 per hour.

On 105 mm. shells the hourly production has been approximately 287 pieces with eight-hour turn production of 1600.

As a result of recent production speed-ups, Salem engineers, believe that with the proper type of blank producing equipment, a maximum of 360 75 mm. shell forgings should be produced in an hour, while even the larger 155's could be turned out at a rate of 160 per hour.

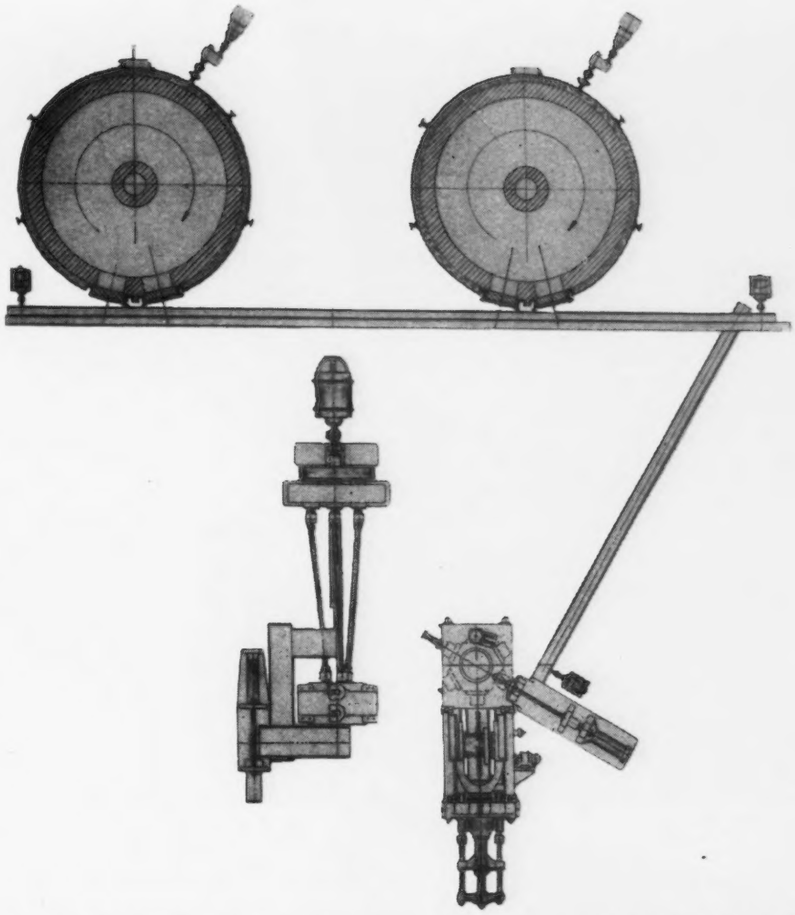
The Witter process has been designed to meet mass production requirements and employs the use of either round billets or round cornered square billets. It calls for modern heating equipment a high production blank piercing press, and the special equipment for rolling to rough turned diameters.

Although Salem contemplated the use of an entirely new mill from beginning to end, the company found that the process was ideally adaptable to equipment already existing in many plants. Not only could a group of single punch and single die presses be used to form the pierced blank, but it was found that board or steam drop hammers and conventional upsetters could also perform the same function. Because the finishing mill used in the process is capable of handling not less than 250 75, 90, or 105 mm. shells per hour and because this type of equipment is expected to be used at its highest production possibilities, Salem believes that a group of presses or a pair of hammers or upsetters should be utilized.

Where ordinarily from 60 to 70 blanks are produced from a conventional press, it would require from three to four such units to provide the 250 per hr. necessary for the Witter process. To reach the higher production (Salem is estimating that with proper equipment probably 360 75 mm. shells per hr. could be produced) more presses of course would be necessary.

From actual experience it was found that in order to maintain production around 250 shell forgings per hr. on the finishing mill, two drop hammers can provide sufficient blanks and similarly two upsetters could meet that production requirement.

Where no existing equipment is available, Salem has designed and is building a double turret type high production blank piercing press capable of supplying from this single unit the entire requirements of the finishing mill.



SCHEMATIC drawing of rotary blank heating furnaces, high speed turret type piercing press (lower right) and Assel mill.

Using the complete process as developed by Salem Engineering Co., the estimated cost of shell forgings produced on the basis of 250 per hr. is $39.50 per 1000. This covers labor and maintenance, but overhead and amortization costs must be added, as well as other factors, in case existing equipment is utilized in place of the high speed piercing press mentioned above.

Salem Engineering Co. claims an outstanding feature of the Witter process is to be found in substantial savings of material by producing a 75 mm. shell forging from approximately 16 lb. of billet steel as against 20 lb. utilized by some processes. The machined forging weighs approximately 10 lb. Hence on large scale mass production, it is said that a weight saving amounting to 20 per cent would be a decided national defense factor in view of the tight steel situation. This saving in material is also reflected in transportation to the forging plant, machining and tool costs, and power requirements.

Hourly Shell Output by Witter Process

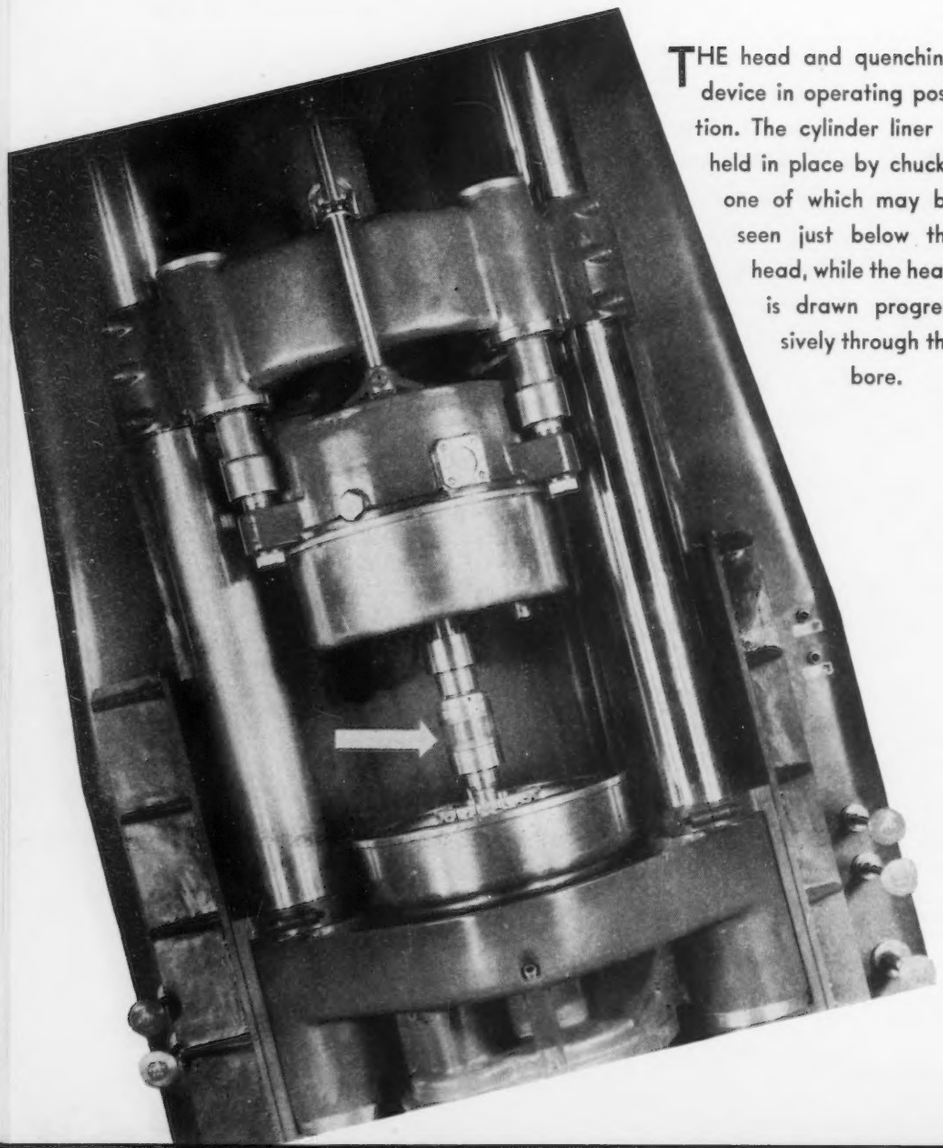
	Original Estimate	Latest Estimate Based on Production
Mill No. 1:		
75 mm	280	360
90 mm.	240	300
105 mm.	200	240
Mill No. 2:		
105 mm.	200	240
5 in. AA.	180	200
5.5 in.	160	180
155 mm.	160	160

Hard Bores–

INDUCTION heat treatment of the bores of cast iron cylinder liners used in its entire line of diesel tractors is now the practice at Caterpillar Tractor.

The adaptation of the revolutionary process, developed by Budd Induction Heating, Inc., produces an I.D. surface of controlled hardness, depth from the surface, and area in the bore of the liner, resulting in a longer wearing sleeve with markedly improved physical properties.

In this installation, to which Caterpillar has applied the trade name, Hi-Electro, the heat treating machine hardens the inside diameters of the cast iron liners to a surface hardness of 52-55 Rc, which is subsequently tempered to a slightly lower hardness. Depth of the hardened area developed is approximately 0.070 in. Liners from 10 in. to 15 in. in length, with bores varying from 3¾ in. to 5¾ in. I.D. are in production. Following the operation of hardening and tempering, the bores are honed to the final finish, before "Surfiding." after which the O.D. is finish turned for insertion into the cylinder blocks.



THE head and quenching device in operating position. The cylinder liner is held in place by chucks, one of which may be seen just below the head, while the head is drawn progressively through the bore.

Differential hardening by electromagnetic induction is accomplished through the concentration of high power, high frequency currents in the surface zone to be hardened. As applied in the Budd method of hardening the inside diameters of cylindrical objects, such as cylinder liners, the currents are caused to flow almost entirely in the shallow internal surface zone to be heated and to be so concentrated that the temperature of the zone affected is raised to hardening temperature before any substantial amount of heat can drift to the remainder of the piece. Then there is an immediate application of a controlled water quench.

At Caterpillar the operation is accomplished through the use of a carefully engineered induction heat "head" which is drawn evenly through the bore under treatment,

Electrically

or conversely the part is drawn progressively over the heat "head."

The movement of the head, application of the current, and operation of the quench are all entirely automatic, thus removing any possibility of error in the process once the machine has been set for a particular operation.

The machine is extremely flexible, and is carefully designed for rapid changeover from one size bore operation to another.

As the machine is compact enough to be placed directly in a production line (as it has in the Caterpillar application), the need for trucking or handling of parts between the line and heating ovens is eliminated, and only one operator is required.

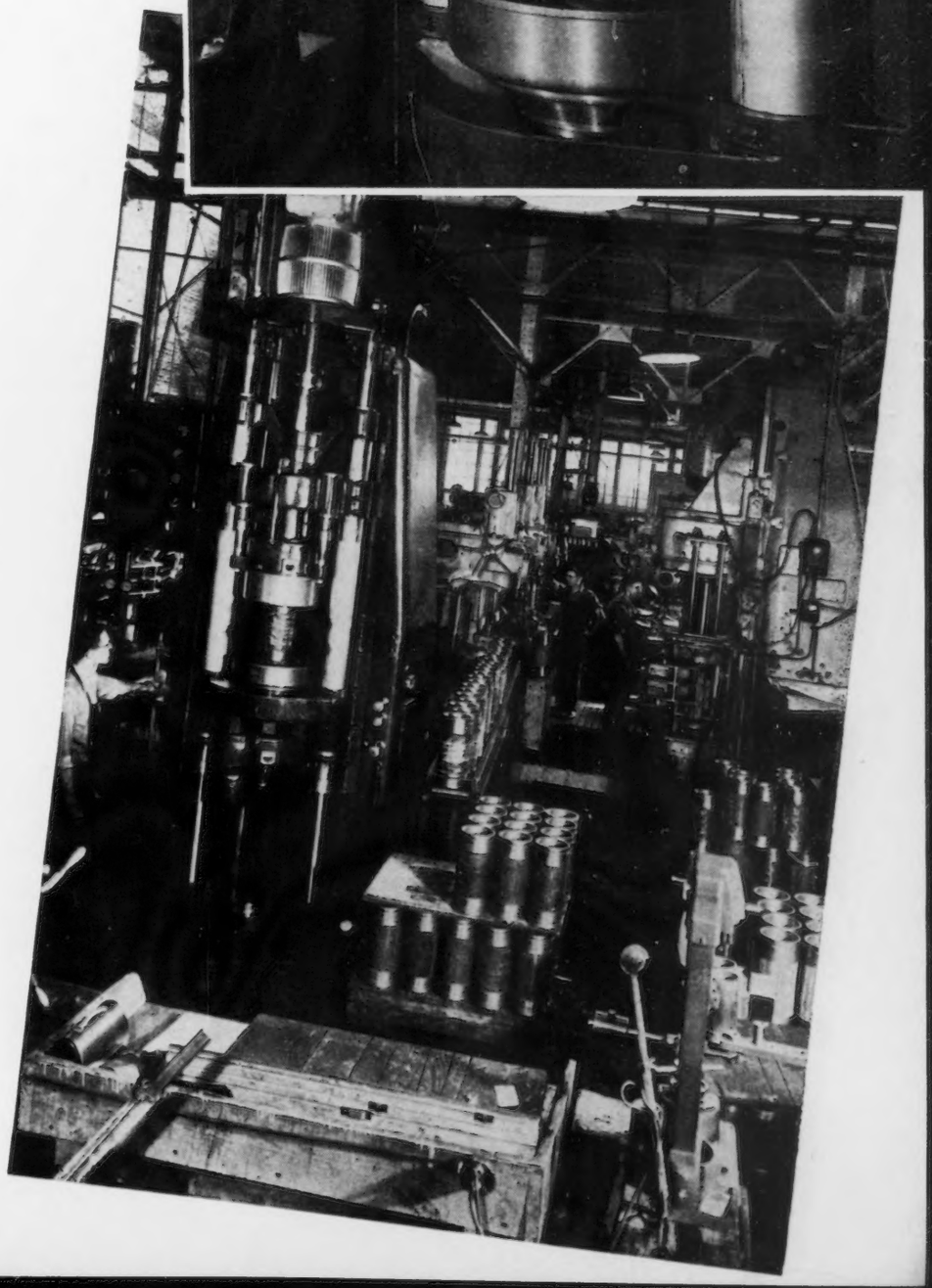
To the question, "How long a cylinder can you treat?" Budd engineers answer, "How long a bore do you have in mind?" Lengths varying from a fraction of an inch upward can now be treated, and it requires only the adoption of known engineering principles to the design of equipment for lengths other than those now in production.

New applications of the process are now engaging the attention of many engineering departments in widely divergent fields. Its use in aircraft engines, where light weight and resistance to wear are vital, is under consideration. Machines for the heat treatment of oil well casings, to increase joint strength, are now under construction at the Budd plant.

o o o

A DIESEL cylinder sleeve is placed in the induction heat treating machine for the hardening operation.

o o o



CATERPILLAR'S installation of the Budd induction heat treating machine, where the I.D. of all liners is inductively hardened. Note that the machine is located directly in the production line.

1500 TOOL STEELS

THIS is a continuation from last week of the indexing of approximately 1500 tool, metal cutting and die steels, and sintered carbides. In some instances the same steel is shown under several variations of the same name, in conformity with shop practice; the same steel is on occasion listed under a manufacturer's name and under a distributer's name; occasionally steels no longer made are indexed for the sake of full coverage; and, of course, some imported steels indexed are for the time being unobtainable. Thus, this indexing of all known tool steels should have maximum application in enabling users to locate and ascertain the properties of any steel produced in this country. This indexing of steels is completed in this issue.

T

2 C 30
Oil hardening, tough structure steel, containing C 0.35, Cr 0.75, Ni 1.75, Mo 0.45. Heppenstall Co., Pittsburgh.

2400 Metal
More properly Haynes Stellite 2400 alloy. See Stellite. The 2400 alloy is a cobalt-chromium-tungsten alloy capable of cutting at higher speeds than J-Metal tools. Haynes Stellite Co., Kokomo, Ind.

2002 ES
A special alloy steel, containing Cr. Poldi Steel Works, New York.

2002 Special
A special alloy steel, containing W, Cr and V. Poldi Steel Works, New York.

212
A special alloy steel, containing W, Cr and V. Poldi Steel Works, New York.

2-70
A shock resisting chisel and punch steel. Crucible Steel Co. of America, New York.

Two Star
A high speed tool steel. Contains C 0.70, Cr 4.00, V 1.00, W 18.00. Midvale Co., Nicetown, Philadelphia.

Two Star Special
A high speed tool steel. Contains C 0.90, Cr 4.00, V 2.00, W 18.00, Mo 0.55. Midvale Co., Nicetown, Philadelphia.

U

UB Double Bolt
Hollow drill steel, containing C 0.75. Mn 0.25, Si 0.25. Uddeholm Co. of America, Inc., New York.

UHB Cold Header Die
A water hardening steel for cold heading dies, contains C 0.91-0.98, Mn max. 0.30, Si max. 0.30. Uddeholm Co. of America, Inc., New York.

UHB Forma
Case hardening steel for molds for plastics, containing C max. 0.05, Mn max. 0.10, Si max. 0.10. Uddeholm Co. of America, Inc., New York.

UHB-46
Oil hardening non-deforming steel, containing C 0.90, Cr 0.50, Mn 1.10, V max. 0.10, W 0.50, Si 0.35. Uddelholm Co. of America, Inc., New York.

UHB Standard
Water hardening steel, containing C 1.00, Mn max. 0.40, Si max. 0.35. Uddeholm Co. of America, Inc., New York.

UHB Valand 2
Oil or air hardening, hot work steel, for heavy duty hot work, containing C 0.32, Cr 2.50, Mn 0.25-0.35, Co 2.00, V. 0.35, W 9.50, Si 0.25-0.35. Uddeholm Co. of America, Inc., New York.

Ultimo No. 6
A special alloy steel, containing Cr and Ni. Canadian Atlas Steels, Ltd., Welland, Ont., Canada.

Ultra Capital, Plus One
A high speed steel, containing W and Co. Adams & Osgood Steel Co., Boston.

Ultradie No. 1
Oil hardening die steel, for blanking dies, etc. Is very tough and hard. Contains C 2.25, Cr 13.00, Mn 0.30. V 0.20, Si 0.25. Universal-Cyclops Steel Co., Bridgeville, Pa.

Ultradie No. 2
Air hardening die steel, for blanking dies, etc. Is very tough and hard. Contains C 1.50, Cr 11.50, Mn 0.30, V 0.25, Mo 0.80, Si 0.25. Universal Cyclops Steel Co., Bridgeville, Pa.

Unico
Water hardening steel, for chisels, shear blades, punches, etc. Is extra tough. Contains Cr 0.70, Mn 0.30-0.40. W 1.30. Si 0.30-0.40. Hidalgo Steel Co., New York.

Uni-Die
A non-deforming steel. Columbia Tool Steel Co., Chicago Heights, Ill.

Unito Drill Rod
A plain carbon steel. Kidd Drawn Steel Co., West Aliquippa, Pa.

Uranus Extra
A plain carbon steel. Hidalgo Steel Co., Inc., New York.

Uso
Water hardening steel for striking dies. Analysis not specified. Hidalgo Steel Co., New York.

Uso-AD
Oil hardening steel, for blanking and trimming dies, containing C 1.55, Cr 11.00, V 0.20, Mo 0.70. Hidalgo Steel Co., New York.

Uso-HE
Oil hardening, non-deforming steel, for dies and gages, containing C 1.50, Cr 0.50, V 0.25, W 1.60. Hidalgo Steel Co., New York.

Uso-NS
Oil hardening, non-deforming steel, for broaches, blank and stamping dies, gages, etc. Contains C 0.80, Cr 0.20-0.25, Mn 1.50. Hidalgo Steel Co., New York.

Uso-Special Vanadium
Water hardening steel, for heading and ripper dies, shear blades, taps, reamers, etc. Analysis not specified. Hidalgo Steel Co., New York.

Uso-30 CF
Oil or air hardening steel for hot die work, containing C 0.30, Cr 3.00, V 0.25, W 8.80. Hidalgo Steel Co., New York.

Uso-Tungsten
Oil or air-hardening high speed steel, for lathe tools, drills, milling cutters, etc. Contains Cr 4.00, V 0.80, W 18.00. Hidalgo Steel Co., New York.

Uso Vanadium
Water hardening steel, for striking dies. Analysis not specified. Hidalgo Steel Co., New York.

Utex
Swedish oil-hardening tool steel. Contains C 0.95, W 2.00, Mn 0.45, Cr 0.60. Diehl Steel Co., Cincinnati.

Utica
Tungsten-chrome, oil hardening steel, for blanking punches and dies, taps, drills, reamers, and broaches. Holds a keen edge and has fair resistance to wear. Contains C 1.25, Cr 0.40, V 0.20, W 1.40. Allegheny Ludlum Steel Corp., Watervliet, N. Y.; also Edgecomb Steel Co., Philadelphia.

Utilitas
A plain carbon steel. Jessop Steel Co., Washington, Pa.; also, Edgar T. Ward's Sons Co., Pittsburgh.

Utilities (Lion)
An extra carbon steel. Jessop Steel Co., Washington, Pa.

Utility
Water hardening steel for chisels, blacksmith tools, drills, etc. Has good hardness and wear resistance. Contains C 0.60 to 0.90, Mn 0.25 to 0.60, Si 0.20 to 0.40. Lehigh Steel Co., New York.

V

Vanadium
A special alloy steel, containing Cr and V. Vanadium-Alloys Steel Co., Latrobe, Pa.

Vanadium Crucible
A tough, water hardening steel, for cold forming dies and special tools. Contains C 0.80 to 0.90, Mn 0.30 to 0.40, V 0.15 to 0.25, Si 0.30. McInnes Steel Co., Corry, Pa.

Van Die Car
A special alloy steel. Ziv Steel & Wire Co., Chicago.

Vanite
High vanadium, high speed steel for lathe and automatic tools, milling cutters, reamers, locomotive tire tools. Resists abrasion and holds a keen cutting edge. Contains C 0.80, Cr 4.00, Mn 0.30, V 2.00, W 18.00, Mo 0.65, Si 0.35. Columbia Tool Steel Co., Chicago Heights, Ill.

Van Lom
A molybdenum high speed steel. Vanadium-Alloys Steel Co., Latrobe, Pa.

Vasco
An oil-hardening non-deforming die steel. Vanadium-Alloys Steel Co., Latrobe, Pa.

Vascoloy-Ramet
A cemented carbide for high speed cutting of steel, iron and non-ferrous materials made in 11 grades, containing tungsten carbide (WC) tantalum carbide (TaC) and other metal carbides in a cobalt binder. Vascoloy-Ramet Corp., North Chicago, Ill.

Vatool
Water hardening steel, for tools, containing C 0.95, Mo 0.25. Henry Disston & Sons, Inc., Philadelphia.

Venango
Chisel steel, for punches, chisels, rivet sets, etc. Very tough and resistant to fatigue. Contains C 0.50, Mn 0.45, V 0.20, Mo 0.50, Si 1.10. Universal-Cyclops Steel Co., Bridgeville, Pa.

Veribest Drill Rod
An oil-hardening steel, containing C 0.90, Si 0.35, Mn 1.10, Cr 0.60, W 0.90, V 0.24. Diehl Steel Co., Cincinnati.

Very Best
A special alloy steel, containing Cr. Boyd-Wagner Co., Chicago.

Vibro
Hot and cold work, shock resisting steel, for shear blades, chisels, dies and punches, containing C 0.40-0.50, Cr 1.30-1.50, Mn 0.20-0.30, V 0.20-0.30, W 1.75-2.00, Si 0.15-0.30. Braeburn Alloy Steel Corp., Braeburn, Pa.

Viking
Chromium-molybdenum steel for mandrels and rams, containing C 1.00-1.10, Cr 1.00-1.10, Mn 0.30-0.50, Mo 0.35-0.50, Si 0.20-0.35. Braeburn Alloy Steel Corp., Braeburn, Pa.

Vinco
A general purpose high speed steel, containing C 0.55-0.75, Cr 3.75-4.25, Mn 0.15-0.30, V 1.00-1.25, W 17.50-18.50, Si 0.15-0.30. Braeburn Alloy Steel Corp., Braeburn, Pa.

Vinco-Hot Work
A high speed, hot work steel, for dies and punches, containing C 0.50-0.55, Cr 3.75-4.25, Mn 0.15-0.30, V 0.85-1.00, W 17.50-18.50, Mo 0.15-0.25, Si 0.15-0.30. Braeburn Alloy Steel Corp., Braeburn, Pa.

Visto
A high speed steel. Hidalgo Steel Co., Inc., New York.

VM Dreadnought
A moly high speed steel, used where wear resistance and toughness are more important than red hardness. Contains C 0.86, Cr 4.00, V 2.00, Mo 8.00. Hawkridge Brothers Co., Boston.

Vul-Mo
A molybdenum high speed steel. Vulcan Crucible Steel Co., Aliquippa, Pa.

W

W
Oil or water hardening steel, for dies and hobs. Has special toughness. Contains C 0.45, Cr 0.85-0.95, Mn 0.20-0.30, Mo 0.20, Si 0.20. Darwin & Milner, Inc., Cleveland.

Wando
Oil hardening die steel, for blanking dies, etc. Is tough and hard. Contains C 0.90, Cr 0.50, Mn 1.10, V 0.20, W 0.50, Si 0.25. Universal-Cyclops Steel Co., Bridgeville, Pa.

Warplis
Oil hardening, non-deforming steel, for pin header, eyelet, perforating and other special punches, precision gages, dies, rivet knockout pins, plugs, drills. Contains C 0.90, Cr 0.50, Mn 1.10, V 0.10, W 0.50, Si 0.35. Pittsburgh Tool Steel Wire Co., Monaca, Pa.

Warranted
An extra carbon steel. Halcomb Steel Co., Syracuse, N. Y.

Warranted Best
A plain carbon steel. Hobson, Houghton & Co., Inc., New York.

Washington
A water hardening, high production steel. Contains C 1.90, Mn 0.30, Si 0.25. Jessop Steel Co., Washington, Pa.; also Edgar T. Ward's Sons Co., Pittsburgh.

Waterdie
Carbon-chromium, water hardening steel for large dies, rolls and tools. Contains C 1.00, Cr 0.50, Mn 0.25, Si 0.25. Columbia Tool Steel Co., Chicago Heights, Ill.

Waterdie B
Carbon-chromium, water hardening steel for large rolls, dies and forming tools. Good hardness and depth of hardness. Contains C 1.00, Cr 0.50, Mn 0.25, Si 0.25. Columbia Tool Steel Co., Chicago Heights, Ill.

Weldo
Straight carbon, water hardening steel, for re-steeling of picks, and for all welding purposes. Hidalgo Steel Co., New York.

Whelco-Standard
Water hardening steel, for cold cutting and heading dies, centers, mandrels, reamers, gages, etc., containing C 1.00, Mn 0.30, V 0.18. Wheelock, Lovejoy & Co., Inc., Cambridge, Mass.

White Label
Hard and tough water hardening tool steel. Contains C 0.80 to 1.10, Mn 0.40 max., Si 0.10 to 0.20. Heller Brothers Co., Newark.

White Label
A high grade straight carbon tool steel, for general machine shop and forge shop purposes. Contains C 0.90 to 1.00. A. Milne & Co., New York.

White Label
A non-deforming, air hardening steel, for heavy stamping dies, coining and cold forming dies, etc. Contains C 1.60, Cr 13.00, Mn 0.35, V 0.30, Mo 0.80, Si 0.30. Peninsular Steel Co., Detroit.

Widia Metal
The original tungsten carbide material first patented in Germany and produced by the Krupp Works.

Willey's Tungsten Carbide
Tungsten carbide cutting tools; also, Willey's Torpedo wheel dressing tools. Various grades are designated as Z, E-12, E-10, E-8, E-6, E-5, E-4, X, XS, XSS, and D, for various grades of steel, cast iron and non-ferrous metals. Willey's Carbide Tool Co., Detroit.

Windsor
A special air hardening steel, used for the same purpose as 3-C and CNS die steel where the initial price must be lower. Contains C 0.98, Cr 5.25, Mn 0.35, V 0.25, Mo 1.00, Si 0.40. Jessop Steel Co., Washington, Pa.

Wire Drawing Alloy (Special)
Tough, abrasion resisting steel for wire drawing dies. Contains C 2.35, Cr 1.90, Mn 1.65, W 10.50, Si 0.60. Columbia Tool Steel Co., Chicago Heights, Ill.

Wizard
An oil and water hardening steel, for pneumatic chisels, shock tools, chisels, etc. Contains C 0.45, Cr 0.80, Mn 0.35, W 0.85, Si 0.30. Agawam Tool Co., West Springfield, Mass.

W.K.Z. Hot Work
A special alloy steel, containing W. Houghton & Richards, Inc., Boston.

W-9
A special alloy steel, containing W. Hidalgo Steel Co., Inc., New York.

Woco
Steel for shock tools. Contains C 0.45, Cr 1.00, W 2.50. Bissett Steel Co., Cleveland.

Wolfram
An 18-4-1 high speed steel. Vulcan Crucible Steel Co., Aliquippa, Pa.

Wolfram Cobalt
A cobalt high speed steel. Contains W 18, Cr 4, V 1 and Co 4. Vulcan Crucible Steel Co., Aliquippa, Pa.

Wolva
A special alloy steel, containing W. Latrobe Electric Steel Co., Latrobe, Pa.

Wortle
A special alloy die steel, containing W. Latrobe Electric Steel Co., Latrobe, Pa.

Wortle Die
A special alloy steel. John A. Crowley Co., New York.

Wortle No. 4 Drawing Die
A heat-treated steel, for cold drawing dies. For larger sizes of coil drawing, as well as bars in sizes up to 4 in. Contains C 1.95, Mn 0.45, W 3.00, Si 0.15. Hawkridge Brothers Co., Boston.

W. T.
Water or oil hardening tap and drill steel. Contains C 1.20, Cr 0.40, Mn

0.25, V 0.35, W 1.40, Si 0.25. Latrobe Electric Steel Co., Latrobe, Pa.

W Tap
A special alloy steel, containing W. Latrobe Electric Steel Co., Latrobe, Pa.

W-3
A special alloy steel, containing W. Hidalgo Steel Co., Inc., New York.

W.W.S.H.
A special alloy steel, containing W. Latrobe Electric Steel Co., Latrobe, Pa.

X

X
A plain carbon steel. Bethlehem Steel Co., Bethlehem, Pa.

XX
An extra carbon steel. Bethlehem Steel Co., Bethlehem, Pa.

XXX
A plain carbon steel. Bethlehem Steel Co., Bethlehem, Pa.

XCL
A plain carbon steel. Bethlehem Steel Co., Bethlehem, Pa.

X. D. H.
Hot work steel, for shear blades and glass molds. Has high heat resistance. Contains C 0.55, Cr 4.00, V 1.00, W 18.00. Firth-Sterling Steel Co., McKeesport, Pa.

X. D. L.
Hot work steel, for extrusion dies and punches. Has resistance to abrasion and heat. Contains C 0.40, Cr 4.00, V 0.50, W 15.50. Firth-Sterling Steel Co., McKeesport, Pa.

X. D. M.
Hot work steel, for hot work dies and extrusion dies. Has resistance to heat and shock. Contains C 0.45, Cr 4.00, V 0.50, W 18.00. Firth-Sterling Steel Co., McKeesport, Pa.

X. L. Chisel
Tungsten oil hardening chisel steel, for chisels, punches, pneumatic tools, stamps, shear blades, cold cutters, etc. Contains C 0.55, Cr. 1.25, Mn 0.25, V 0.25, W 2.00, Si 0.25. Latrobe Electric Steel Co., Latrobe, Pa.

Y

Yellow Label
Carbon-vanadium, water hardening steel for tools and dies. Is hard and tough. Contains C 0.95 to 1.10, Mn 0.40 max., V 0.15 to 0.25, Si 0.15 to 0.30. Heller Brothers Co., Newark.

Yellow Label
A non-deforming, oil hardening steel, for punches, gages, intricate shape dies. Contains C 0.95, Cr 0.50, Mn 1.20, V 0.22, W 0.50, Si 0.25. Peninsular Steel Co., Detroit.

Z

Zip
An oil hardening steel, for lathe, planer, shaper tools for cutting and machining cast steel. Contains C 0.65 to 0.70, Cr 4.00, Mn 0.30, Co 7.00 to 8.00, V 1.50 to 1.75, W 17.00 to 18.00, Mo 0.70 to 1.00, Si 0.35. Agawam Tool Co., West Springfield, Mass.

Zip-Zip
A special alloy shock-resisting chisel and punch steel. Jessop Steel Co., Washington, Pa.; Edgar T. Ward's Sons Co., Pittsburgh.

Zivco
A plain carbon steel. Ziv Steel & Wire Co., Chicago.

Ziv's
A plain carbon steel. Ziv Steel & Wire Co., Chicago.

Z. N.
Hot work steel for die casting dies, containing C 0.45-0.50, Cr 0.80-0.90, Mn 0.60-0.80, Si 0.15-0.30. Braeburn Alloy Steel Corp., Braeburn, Pa.

Z. T. Die
A special alloy steel, containing Cr. Latrobe Electric Steel Co., Latrobe. Pa.

o o o

United States Producers and Distributers of Tool, Metal Cutting, and Die Steels, and Sintered Carbides

A

Achorn Steel Co., 381 Congress St., Boston, Mass.
Previously agent for Fagersta Bruks A.B., Gimo-Osterby Bruks A.B., Horndals Jernverks A.B., and Klosters A.B., q.v.

Adams & Osgood Steel Co., 23 Purchase St., Boston, Mass.
Same trade names used by Bissett Steel Co., Cleveland.

Agawam Tool Co., West Springfield, Mass.

Ajax Tool Steel Sales, 114 Liberty Street, New York, N. Y.
Previously agent for Poldi Steel Works, Prague.

Albany Higrade Steel Corp., Albany, N. Y.

Allegheny-Ludlum Steel Corp., Oliver Building, Pittsburgh, Pa.

Amalgamated Steel Co., 7835 Broadway, Cleveland, Ohio.

Anchor Drawn Steel Co., Latrobe, Pa.
Cold drawn division of Vanadium-Alloys Steel Co. Supplies all vanadium alloys in form of drill rod or cold drawn special shapes.

Andrews Steel Co., Newport, Ky.

Armstrong Brothers Tool Co., 309 N. Francisco Ave., Chicago, Ill.

Atlantic Steel Co., General Motors Building, New York, N. Y.

B

Alexander Benecke, 347 Madison Avenue, New York, N. Y.
Previously agent for Deutsche Edelstahlwerke A.G. q.v., Krefeld, Germany.

Bethlehem Steel Co., Bethlehem, Pa.

Bissett Steel Co., 947 East 67th St., Cleveland, Ohio.

H. Boker & Co., Inc., 101 Duane St., New York, N. Y.

Boyd-Wagner Co., 1440 West Lake St., Chicago, Ill.

Braeburn Alloy Steel Corp., Braeburn, Pa.

C

Canadian Atlas Steels, Ltd., Welland, Ontario, Canada.

Cannon-Stein Steel Co., 799 S. State St., Syracuse, N. Y.

Carboloy Company, Inc., 11177 E. 8-Mile Road, Detroit, Mich.

Carpenter Steel Co., Reading, Pa.

Colmony, Inc., Las Nietos, Cal.

Colonial Steel Co., Grant Building, Pittsburgh, Pa.

Columbia Tool Steel Co., Lincoln and State Sts., Chicago Heights, Ill.

Craine-Schrage Steel Co., 8701 Epworth St., Detroit, Mich.

John A. Crowley Co., 120 Liberty St., New York, N. Y.

Crucible Electric Steel Co., Homestead, Pa.

Crucible Steel Co. of America, Chrysler Bldg., New York, N. Y.

D

Darwin & Milner, Inc., 1260 West 4th St., Cleveland, Ohio.

Delaware Tool Steel Corp., East Wilmington, Del.

Denman and Davis, North Bergen, N. J.

Detroit Alloy Steel Co., 6500 Wight St., Detroit, Mich.

Diehl Steel Co., 236 Broadway, Cincinnati, Ohio.

Henry Disston & Sons, Inc., Unruh and Milner, Philadelphia, Pa.

Driver-Harris Co., Harrison, N. J.

Duke Steel Co., Inc., 99 Beekman St., New York, N. Y.

E

Eaton Mfg. Co., 1940 Rose St., Massillon, Ohio.

Edgar Allen Steel Co., 741 Washington Street, New York, N. Y.
Agent for Edgar Allen & Co., Sheffield, England; and division of A. Milne & Co.

Edgcomb Steel Co., 3600 No. "D" Street, Philadelphia, Pa.
Also, sales agent for Allegheny Ludlum Steel Corp.

Ekstrand & Tholand, Inc., 441 Lexington Avenue, New York, N. Y.
Previously agent for Degefors Iron & Steel Works, Degefors, Sweden; Also, Höganäs Billesholms A.B. Höganäs, Sweden.

Ekstrom, Carlson & Co., 1437 Roadrail Ave., Rockford, Ill.

K. Engelsted, Stamford, Conn.

F

Faitoute Iron & Steel Co., Newark, N. J.

Fansteel Metallurgical Corp., 2200 Sheridan, North Chicago, Ill.

A. Finkl & Sons Co., 2011 N. Southport Ave., Chicago, Ill.

Firth-Sterling Steel Co., McKeesport, Pa.

Forging & Casting Corp., Wanda at 9-Mile Road, Ferndale, Mich.

Peter A. Frasse & Co., 17 Grand St., New York, N. Y.

G

D. G. Gautier & Co., 50 Church St., New York, N. Y.

H

Halcomb Steel Co., Syracuse, N. Y.
Subsidiary of Crucible Steel Co. of America.

Hammond & Irving, Inc., 40 Gallagher St., Auburn, N. Y.

Edward L. Hand & Co., 521 Arch St., Philadelphia, Pa.
No longer handles tool steels.

Hawkridge Brothers Co., 303 Congress St., Boston, Mass.
Handles steels made by Halcomb Steel Co.

Haynes Stellite Co., Kokomo, Ind.
Unit of Union Carbide & Carbon Corp.

Heller Brothers Co., 879 Mt. Prospect Ave., Newark, N. J.

Heppenstall Co., 4622 Hatfield St., Pittsburgh, Pa.

Hidalgo Steel Co., Inc., 74 Varick St., New York, N. Y.

Hobson, Houghton & Co., Inc., 790 Greenwich St., New York, N. Y.

Houghton & Richards, Inc., 145 Oliver Street, Boston, Mass.

Previously agent for Böhler Brothers & Co., Vienna, Austria.

I

Illingworth Steel Co., Frankford, Philadelphia, Pa.

Now out of business.

Ingersoll Steel & Disc Division, Straus Building, Chicago, Ill.

J

Wm. Jessop & Sons, Inc., 627 Sixth Ave., New York, N. Y.

Jessop Steel Co., Washington, Pa.

A. Johnson & Co., Inc., 650 5th Avenue, New York, N. Y.

K

Kidd Drawn Steel Co., Aliquippa, Pa.

Kloster Steel Corp., 224 N. Justine Ave., Chicago, Ill.

L

Lancaster Steel Co., Inc., 47 Cliff St., New York, N. Y.

Latrobe Electric Steel Co., Latrobe, Pa.

Lehigh Steel Co., 16 Bethune St., New York, N. Y.

M

P. F. McDonald & Co., 10 Power House St., Boston, Mass.

McInnes Steel Co., 1935 Smith St., Corry, Pa.

McKenna Metal Co., Latrobe, Pa.

Metal Carbides Corp., Youngstown, Ohio.

Midvale Co., Nicetown, Philadelphia, Pa.

A. Milne & Co., 741 Washington St., New York, N. Y.

O

Onondaga Steel Co., Inc., Syracuse, N. Y.

P

Paragon Steel & Tool Co., Inc., East Rutherford, N. J.

Patriarche & Bell, 55 Carmine St., New York, N. Y.

Peninsular Steel Co., 1030 McDougall Ave., Detroit, Mich.

Pittsburgh Tool Steel Wire Co., Monaca, Pa.

Poldi Steel Works, 114 Liberty St., New York, N. Y.

Horace T. Potts Co., Philadelphia, Pa.
Also distributes Carpenter steels.

Thomas Prosser & Son, 120 Wall Street, New York, N. Y.
Previously agent for Fried, Krupp Steel Works, Essen, Germany. Now represent Vanadium-Alloys Steel Co., for export.

A. R. Purdy Co., Inc., 790 Greenwich St., New York, N. Y.

R

Republic Steel Corp., Cleveland, Ohio.

Ryer Incorporated, Ltd., 5075 Santa Fe Avenue, Los Angeles, Cal.

Joseph T. Ryerson & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.

S

Scully Steel Products Co., 1301 Wabansia Ave., Chicago, Ill.

Seaboard Steel Co. of America, 1775 Broadway, New York, N. Y.

Simonds Saw & Steel Co., Fitchburg, Mass.

SKF Steels, Inc., 369 Lexington Ave., New York, N. Y.

Stahleker Steel Corp., Cambridge, Mass.

Stulz Sickles Co., 134-142 Lafayette St., Newark, N. J.

Swedish-American Steel Corp., 429 Kent Ave., Brooklyn, N. Y.

Swedish Iron & Steel Corp., 17 Battery Place, New York, N. Y.

Swedish Steel Mills, A.A., 405 Lexington Avenue, New York, N. Y.
Agent for Brukskoncernen A.B., Fagersta, Sweden.

T

Tennessee Coal, Iron & Railroad Co., Birmingham, Ala.

Timken Steel & Tube Co., Canton, Ohio.

Tungsten Electric Corp., Union City, N. J.

U

Uddeholm Co. of America, Inc., 155 East 44th St., New York, N. Y.

Universal-Cyclops Steel Co., Bridgeville, Pa.

V

Vanadium-Alloys Steel Co., Latrobe, Pa.

Vascoloy-Ramet Corp., North Chicago, Ill.
Subsidiary of Fansteel Metallurgical Corp.

Vulcan Crucible Steel Co., Aliquippa, Pa.

W, X, Y, Z

Edgar T. Ward's Sons Co., Post Office Box 1595, Pittsburgh, Pa.

Wheelock, Lovejoy & Co., Inc., 128 Sidney St., Cambridge, Mass.

Willey's Carbide Tool Co., 1340 W. Vernar Highway, Detroit, Mich.

Williamson Brothers, Inc., Bridgeport, Conn.
Successors to Ellsworth - Porcupine Co.

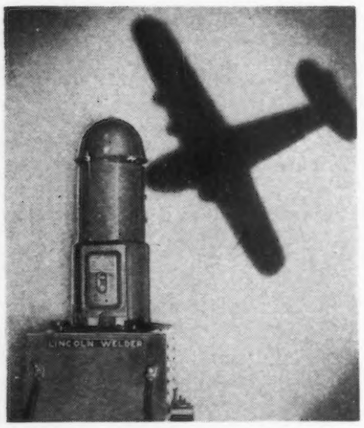
Ziv Steel & Wire Co., 2945 W. Harrison St., Chicago, Ill.

New Equipment

Welding Apparatus

In this review are discussed some of the recent advances in spot and arc welding machines, in control equipment, in flame welding and cutting apparatus and auxiliaries.

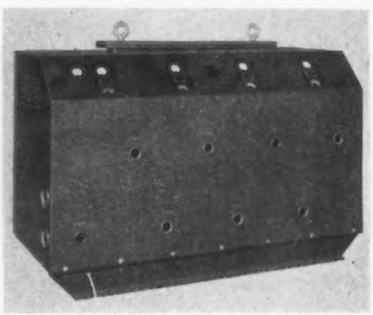
ARC welding machine, designed for aircraft welding, has been developed by the *Lincoln Electric Co.*, Cleveland. Most important of the features is the system of welding current and voltage control for accurate settings, essential for welding particular analyses or



the light and heavy gages of metal employed in modern plane construction. Dual continuous control permits independent and precise adjustment of both welding current and voltage to obtain the right type and intensity of welding arc: The unit delivers 10 amp. at the arc without extra attachments. Overload capacity enables it to withstand sustained operation at the upper portion of its range. The unit is of motor-generator, single-operator, variable voltage type with laminated pole pieces. Connections are readily accessible for either 220 or 440 volts (also for special voltages), three or two-phase. There are two models, either 150 or 200-amp. sizes, portable or stationary.

Heavy Duty Welder

FOR all heavy duty applications the *Glenn-Roberts Co., Inc.*, 1009 Fruitvale Avenue, Oakland, Cal., has developed a new model 85 2000-amp. [illegible] purpose arc welder. It operates either as a single circuit welder with a current range of 100 to 2000 amp., or as a two, three, or four operator multi-circuit machine. Remote control equipment provides stepless, full range current control from a pushbutton station. Although maximum open circuit voltages are 70 volts or less, arc ignition is easy and fast, stability is uniform in all positions and all heats. The unit is provided with infinite ampere adjustment for heat control. Efficiency is claimed to be unusually high, 81.5 per cent being recorded at low heat settings and 94.6 per cent at optimum welding load. Safety for the operator and reliable service are said to have been a prime consideration. There are heavy structural steel transformer frames and bases, fiber glass and mica insulation, and complete protection against deterioration or failure from moisture and heat.



New Welder Series

A LINE of a.c. arc welders with maximum capacities of 75, 150, 200 and 300 amp. has just been announced by *Emerson Electric Mfg. Co.*, of St. Louis. Units have been designed for ease of operation and safety of handling throughout. The inclined selector panel provides easy selection of heat for the operator. Protected jack and plug connections eliminate the danger of personal injury or damage from accidental contact with the connection while in service. The portable, compact, heavy gage metal cabinet is fitted with ventilating louvers on top and sides. There are no moving parts to get out of order. The transformer coils wound with copper magnet wire have flexible, double-spun glass insulation to withstand temperatures in excess of 1000 deg. F. The 200-volt model illustrated has a selection of 18 welding heats, and a range of 20 to 200 amp. It operates on 220 volts, 60 cycle single phase.

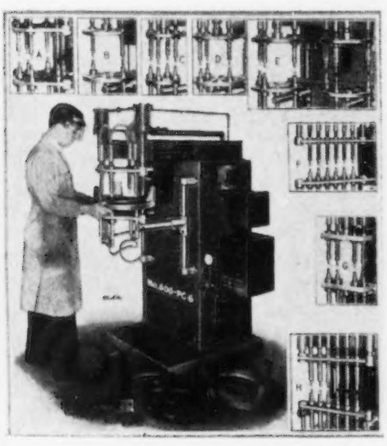
Transformer Type Arc Welder

SIMPLIFIED welding is claimed as the outstanding feature of a new a.c. electric arc welder just announced by the *Ideal Commutator Dresser Co.*, 1925 Park Avenue, Sycamore, Ill. The design includes

a reactance winding on a separate core in addition to the transformer. This reactance winding acts as stabilizer, facilitating the striking of the arc holding it. As the distance between the end of the welding rod varies, the voltage varies proportionately. Fifteen welding heats between 20 and 175 amp. give the operator accurate heat and penetration control. Penetration may be up to ¼ in. or more if desired. These heats are at two voltages, 45 and 70 volts. The standard welder is built for 230 volt, 60 cycle operation; welding rod recommended is 1/16 to 5/32 in. Primary current is 52 amp. under load. The unit weighs 190 lb., and measures 17 x 15 x 26 in.

Multiple Spot Welder

RECENTLY the *Eisler Engineering Co.*, 740 South 13th Street, Newark, N. J., introduced a multiple spot welder. A large variety of spot welding setups are possible on this machine. From two to 12 spots

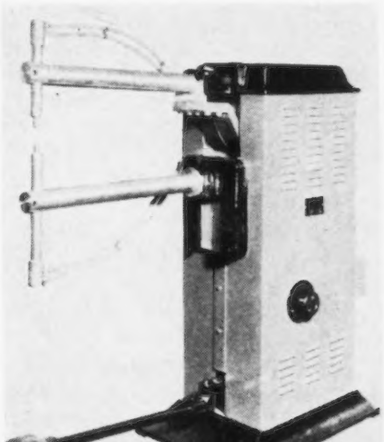


can be made simultaneously in circular, straight, square, rectangular or odd shape welds. These machines are primarily intended for the spot welding of light sheet metal work where a large range of adjustments are to be considered. Pressure electrodes are used with suitable air actuation equipment and individual adjustment facilities for the maintenance of even pressures on all the spot welds.

The same maker produces new transformer type arc welders, 100 to 400 amp. capacity. They are made standard to operate on 220 volts, 60 cycles, a.c., single phase or any single phase of a polyphase circuit and can also be supplied for 440 to 550 volts.

Spot Welders

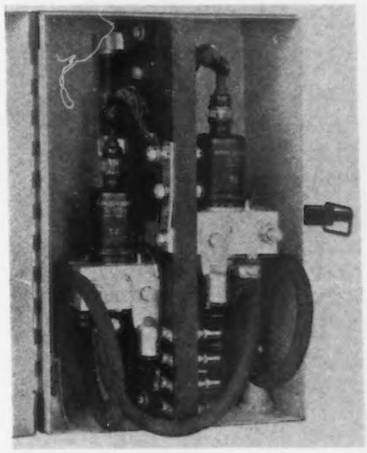
REDESIGNED spot welders are being produced by *Universal Power Corp.*, 4300 Euclid Avenue, Cleveland, under the designation of Model J. The unit frames are made of arc welded steel shapes enclosed



in louvered sheet metal enclosures. The unit is available in a bench type 2½ to 7½ kw. and floor type 2½ to 50 kw. capacity in rocker arm construction. Both types are also furnished up to 20 kw. capacity with a pressing upper electrode. The new line corresponds in its specifications to the well known Model S.

Current Control Tubes

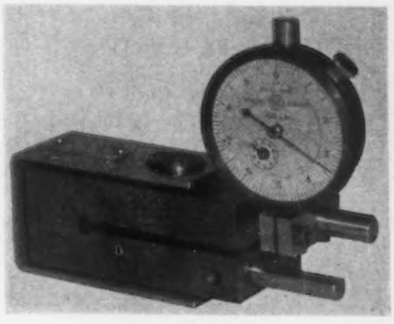
IGNITRON tube, GL-415, for resistance welder control, utilizing a unique water cooling system, has been announced by the *General Electric Co.* The new tube depends for its cooling upon a special clamp into which it is fitted, rather than upon the built in water-jacket formerly used. Therefore removal and replacement of the tubes have been greatly facilitated. The clamp consists of a brass block with water passages and serves as cooling medium and cathode connection. These ignitron tubes can pass high peak



currents. They are thus well suited for controlling current in resistance welding machines. A pair of these tubes is capable of controlling 265 kva. of resistance welding load and a 5.5 per cent duty cycle. At a reduced rating they can be used with air cooling.

Electrode Pressure Gage

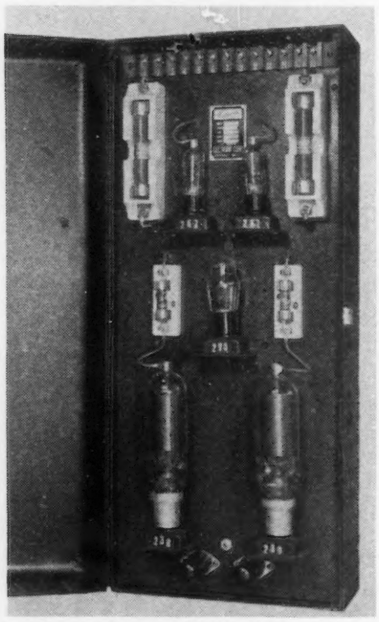
DESIGNED to measure the pressure between the electrodes of resistance welding machines, a new electrode pressure gage has been announced by *General Electric Co.* The gage is for use either as a standard in checking existing gages or pressure indicators on spot, line or projection welders, or for checking the electrode pressures at the time of setup, before proceeding with production work. It may also be used for other pressure determinations in a range from 0 to 4500 lb. An automatic stop safeguards it against damage, if these pressures are ex-



ceeded. Consisting simply of a calibrated steel yoke and a micrometer dial indicator, the gage is easily applicable to existing resistance welding machines without the need for jigs or other auxiliary equipment.

Electronic Synchronizer

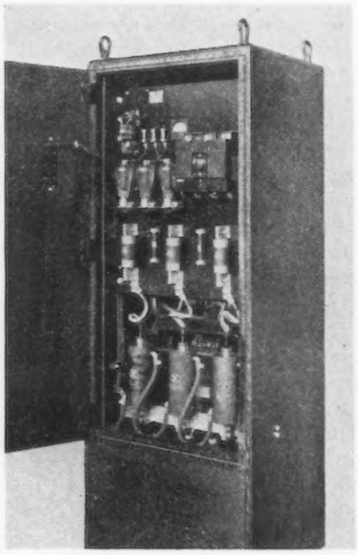
A SYNCHRONIZER has been developed by the *Weltronic Corp.*, 3080 East Outer Drive, Detroit, to be used with any non-synchronous timer and power tube contactor to obtain synchronous operation. The flow of electricity is started at the zero point on an approximately sinusoidal current wave, eliminating transient current and the resulting stresses and strains in the welding transformers, making for much longer transformer life. The uniformity of the welds is improved by the use of



this synchronizer, which is claimed to provide absolute accuracy in timing, even at a rate of operation as high as 1000 welds per min.

Spot Welding Rectifier

FOR supplying d.c. to magnetic energy-storage type spot welders as they are used in the aircraft industry, two ignitron spot welding rectifiers are announced by the *Westinghouse Electric & Mfg. Co.*, East Pittsburgh, for 40 or 120 kw. units. The rectifier consists of a control and protective panel power transformer and ignitron power tubes all contained in a floor mounted sheet metal cabinet which is ventilated by a 14-in. fan, driven by a ⅛-hp. motor. Tubes are arranged

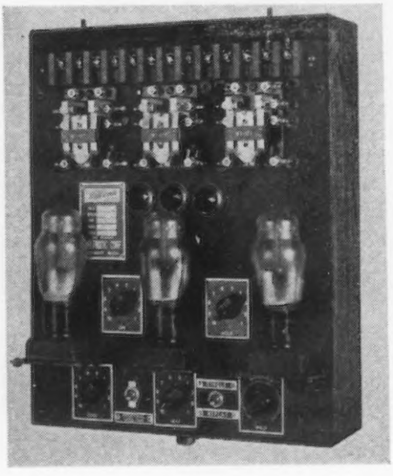


for water cooling, and cooling is controlled by a thermostatic water flow switch.

Capacitor discharge welding control is also brought out by Westinghouse for welding aluminum and alloys. This Condens-O-Weld unit is a complete control for an electrostatic energy storage type of welder. Resistance is designed for operation on 230/60 volts plus or minus 10 per cent, three phase, 50 or 60 cycles. The charging circuit and its control charges a 2640 microfarad capacitor bank to 3000 volts and 40 to 80 spots per minute welding speed can be obtained. Power demands are reduced to a minimum.

Timing Control

ELECTRONIC impulse timers are now available from *Weltronic Corp.* to simplify the welding of heavy sections or to make possible the welding together of as many as 20 pieces of 20-gage steel.

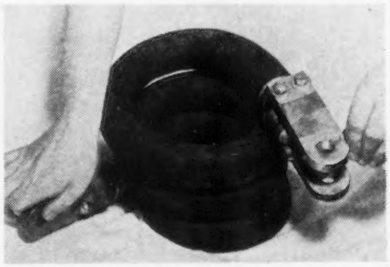


Interruptions of current give the points a chance to cool off, while at the same time the pressure between the points squeezes the metal parts together for better contact. The new line consists of a semi-automatic Model No. 114, adjustable for on, weld and cool time and for the number of current interruptions desired, and a high speed automatic Model No. 57 which also has a dial for regulating the off time between resistance welds. These units are for use in combination with electronic contactors. Individual dials are adjustable in single cycle steps for 60 cycle current in a range from 2 to 20 cycles. Number of interruptions can be set between one and 10. The arms of the three relays are the only moving parts. Timers can be supplied for any commercial voltage or frequency required. Trouble lights are also provided.

The same firm also produces a general purpose timer Model 52 for extremely accurate automatic timing control in almost any cycling or sequencing from 1/30 sec. to 120 sec., for 110 to 220 volts and any frequency. The electronic vacuum tube provides efficient, invariable time control.

Welding Cables

KICKLESS welding cables of fully concentric design for reduced current loss and with posi-

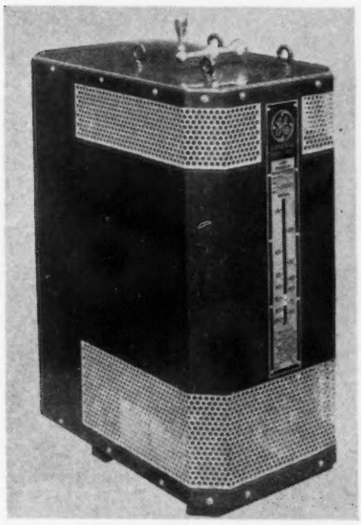


tive and negative current strands wound at steep helical angles to increase ease of flexing and reduce wear are announced by *Progressive Welder Co.*, 3050 East Outer Drive, Detroit. Developed in conjunction with *Habirshaw Cable & Wire Co.*, the new P-H cables are available in a complete range of capacities. Features are: rated capacity 50 per cent in excess of conventional cables of the same size, increased efficiency due to full concentric arrangement of copper, increased life because of extra heavy insulation and marked reduction of wear by external abrasion. Gun handling is thus made easier. The water sup-

ply core consists of ⅜-in. interlocked bronze tubing having high flexibility characteristics. Six current carrying bundles of seven copper strands each enclose this core. Between the outer strands and the cable covering, space is provided for water circulation.

Hydrogen Arc Welder

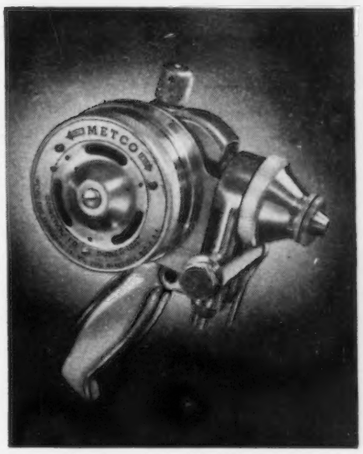
ATOMIC hydrogen arc welders of improved design have recently been made available by *General Electric Co.* in 35- and 75-amp. strength. These welders are finding application for repairing tools and dies, for filling in flaws or blow holes and for the fabrication and repair of hard-to-weld metals. Instead of the transformer and re-



actor used in previous units, the new welder has a specially designed reactive transformer which combines the functions of both. As a result the weight of the welder has been reduced and electrical characteristics improved. Built-in power-factor correction helps to reduce installation and operation cost. Fan-forced ventilation provides cool operation, even at high currents or on high duty cycles.

Metallizing Gun

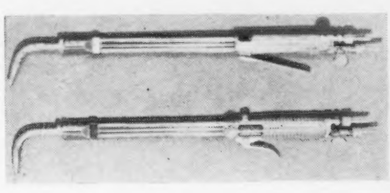
FOR coating large structures with zinc, aluminum, lead or other material or for building up worn shafts, rolls, plungers, etc., with any metal obtainable in wire form, the *Metallizing Engineering Co., Inc.*, Long Island City, N. Y., is producing a metallizing gun to be used as hand or lathe tool. The wire is automatically fed into the gun at an adjustable rate, melted by means of a concentrated flame,



atomized by compressed air and sprayed on any base material. This 2E lightweight gun has a controlled power unit, which gives a uniform and steady wire feed for production service and eliminates the need for gear changes. The universal gas head allows the use of most gaseous fuels without change of head. The deposition of extremely fine coatings is possible at production speed and gas consumption is reduced by improved nozzle and jet construction.

Riser Cutting Apparatus

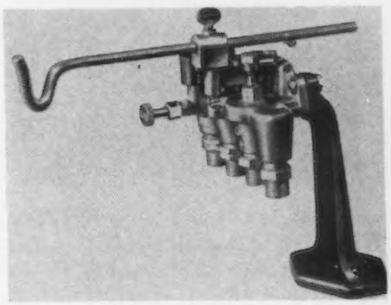
IN response to an increasing demand for greater conveniences in removing riser heads from metal castings, *Air Reduction*, 60 East 42nd Street, New York, has just introduced a new line of hand cutting apparatus, consisting of two torches and three tips. Torches, 21 in. long, styles 3180 and 9080, are of the straight head type, with monel metal heads and stainless steel tubes for longer life. Cutting oxygen can be controlled either by lever or trigger, and the types selected can be fitted to the torch to suit the convenience and comfort of the individual operator. Cutting tip No. 191 is straight, No. 187 bent to 75 deg. and No. 181 to 90 deg. They are designed to permit greater maneuverability in restricted areas. While constructed primarily for cutting risers, the new apparatus is also used successfully in removing rivets and as standard torches for regular and special work.



Gas Economizer

WHERE welding operations are intermittent, the installation of a new economizer made by the *National Cylinder Gas Co.*, 207 West Wacker Drive, Chicago, is claimed to save up to 30 per cent in gas and operator time. The shut-off action is fast, positive and leak-proof. The body and diaphragm bonnets are heavy forged bronze. The new Model 4360 is designed for lightweight torches and for torches which operate at unbalanced gas pressures. The shut-off valve on the lever arm assembly is equipped with adjusting screws which, when set to the proper torch pressure, assure correct seating. An extendable lever arm provides adjustability required with torches weighing a few ounces only. A great variety of gas pressures can be handled.

This firm also produces rivet washing tips accurately machined



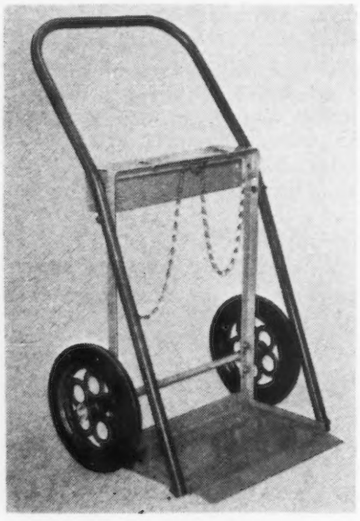
from hard drawn copper for "washing out" rivet heads of all types and sizes for repair or reclaiming, for removing frozen nuts from bolts without damage to the bolt thread, for removing minor defects in castings and for hand or machine gouging.

Welding Torch

AIRADIATOR is the name of a new welding torch nozzle made by the *Victor Equipment Co.*, 844 Folsom Street, San Francisco. For improved air cooling the radiator-like section is made of aluminum and provided with fins. Even under severe field tests and most difficult operations no problems have arisen which prevented the maintenance of the desired flame characteristics. The very large cooling area keeps the tubular section cooler than the ignition temperature of the fuel gas and thus eliminates the pre-ignition and the resulting popping or backfiring. The torch handle is kept comfortably cool throughout.

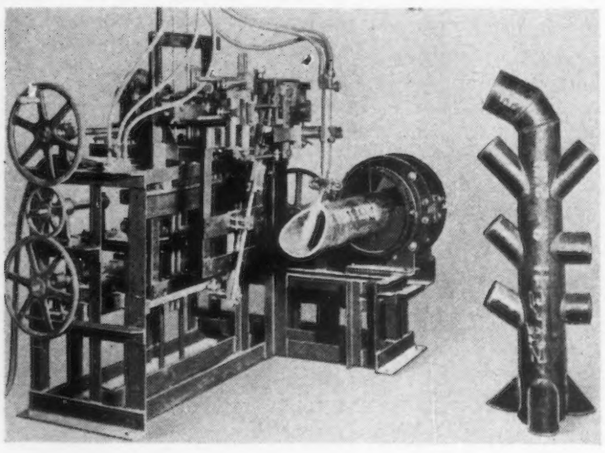
Cylinder Truck

HAND truck designed to carry an oxygen cylinder, an acetylene cylinder and a complete welding and cutting outfit, has just been announced by the *Linde Air Products Co.*, unit of the Union Carbide and Carbon Corp., 30 East 42nd Street, New York. This new truck, known as the Oxweld T-17 two-wheel welding truck, is light in weight, well balanced and has 14-in. wheels equipped with semi pneumatic rubber tires. It is said to be exceptionally easy to handle and it is narrower by 5½ in. than the former model.



Pipe Cutter

CUTTING and joining pipes is facilitated by the Fall-O-Matic universal pipe intersection cutter, made by *Spence Engineering Co., Inc.*, Walden, N. Y. This machine will cut pipes to fit any pipe of the same size or larger, at any angle or offset. The machine is adjusted by four dials, while cutting is acomplished with a standard cutting torch. The machine is hand-operated, since the compound motion changes the cutting speed to such an extent, that the operator must match the speed of rotation with the cutting capacity of the torch. It takes less than 5 min. to set up and complete the cut. The chuck opens up and has a set of adapters for each size of pipe.



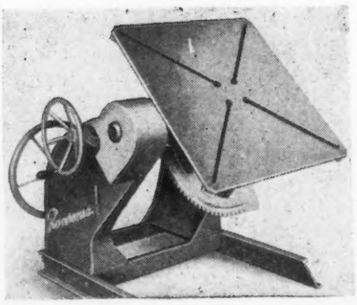
Arc Welding Electrodes

THREE additional shielded arc electrodes, types W-30, W-83 and W-93, have been announced by the *General Electric Co.* All three types are heavily coated and can operate on either d.c. or a.c. W-30 is an A.W.S. E-6012 all position electrode designed for automotive work and piece work industries where high currents are desired for high production speed. For job welders or manufacturers engaged in the fabrication or repair of cast iron, the all position low current type W-83 is well suited. W-93 is designed for building up steel surfaces to resist wear from shock, abrasion and rolling impact. It has extremely smooth arcing characteristics, freedom from spatter and a wide coverage.

General Electric has introduced a new idea for the packaging of its electrodes by labeling them with information concerning weight of deposited metal, obtainable from the 50-lb. contents of each box as well as the length of typical fillet welds that can be made.

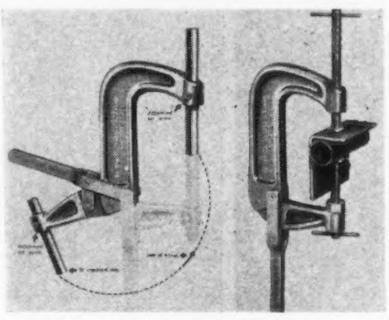
Welding Positioner

PIECES up to 2500 lb. can be fixed in the most suitable position for welding in a new positioner produced by the *Ransome Concrete Machinery Co.*, Dunellen, N. J. Designed to facilitate the handling of material in welding shops, the unit is said to speed up production considerably. The all-welded table top with T-slots for easy clamping revolves 360 deg. and tilts 135 deg. beyond horizontal. A worm and worm wheel arrangement make the table self-locking when handling unbalanced loads. It is available with hand wheels or with tilting and revolving motors under remote control.



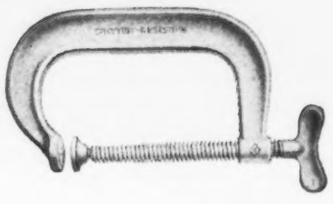
Toggle Action C-Clamp

TOGGLE action C-clamp with two holding rods is being produced by *Detroit Stamping Co.*, Detroit. The operator is thus able to get around obstructions in fixtures and to take in and clamp firmly difficult combinations. The two-rod adjustment permits of holding the work at exactly the right spot and after one setting need not be varied until that particular job is finished. Clamp is made in two models: one has two threaded rods and the other two smooth, set-screw adjusted rods which are especially suited to arc welding work, since there are no threads to burn or damage.



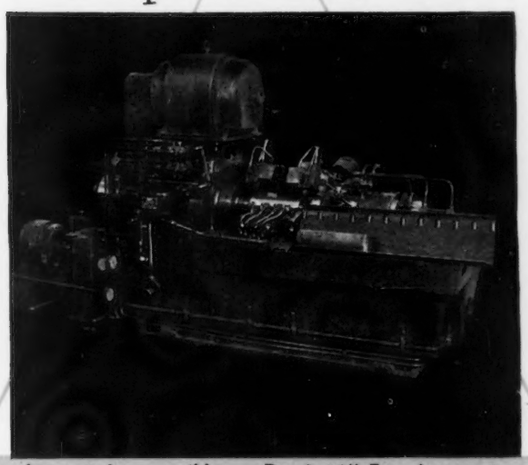
Clamp for Welding

SPATTER resisting finish on this drop forge C-clamp which resists the adherence of welding spatter to body, swivel and screw is now offered by *J. H. Williams & Co.*, 225 Lafayette Street, New York. These completely cadmium plated clamps are available in seven sizes with capacity opening range from 2 to 12 in.

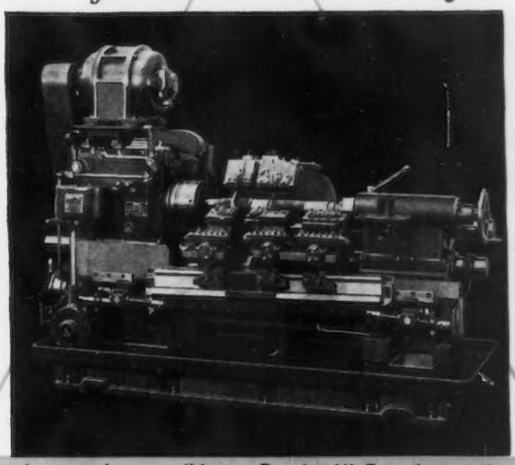


WELL BALANCED

For Preparedness Production *and for Peacetime Profits*



Jones & Lamson (Heavy Duty) 16" Fay Automatic Lathe machining a Shell



Jones & Lamson (Heavy Duty) 16" Fay Automatic Lathe machining a Rear Axle Shaft

Against the necessities of armament production, let us not forget to balance our need for survival in the future economic struggle. No time should be wasted today designing and building special purpose machines for work that can be handled at once and to advantage on versatile, high speed Jones & Lamson equipment. No money need be lost tomorrow scrapping special machines when your Jones & Lamson Turret Lathes, Thread Grinding Machines, Fay Automatic Lathes and Comparators can turn quickly and smoothly to earning long term, peacetime profits for you.

PROFIT PRODUCING
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JONES & LAMSON MACHINE CO.

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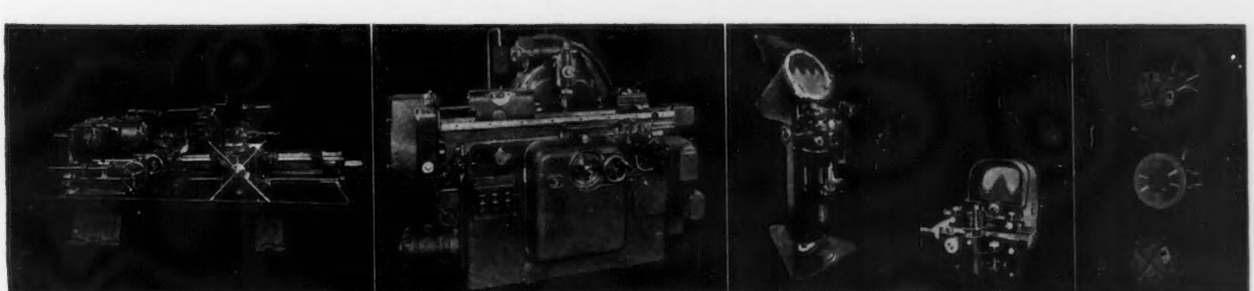
MANUFACTURERS OF RAM & SADDLE TYPE UNIVERSAL TURRET LATHES . . . FAY AUTOMATIC LATHES . . . AUTOMATIC THREAD GRINDING MACHINES . . . COMPARATORS . . . TANGENT AND RADIAL, STATIONARY AND REVOLVING DIES AND CHASERS.



RAM & SADDLE TYPE UNIVERSAL TURRET LATHES | AUTOMATIC THREAD GRINDERS | OPTICAL COMPARATORS | AUTOMATIC OPENING DIE HEADS

On The Assembly Line

BY W. F. SHERMAN
Detroit Editor

• Automobile industry, unable to understand Washington attitude toward it, considers itself the "whipping boy" . . . Favors a natural curtailment instead of one forced upon it . . . Chrysler Corp. states its position regarding Leon Henderson's price ceiling order.

DETROIT—There has appeared as yet no good reason for any change in the philosophy that has been expressed by leaders of the automobile industry in the many months during which they have admittedly faced prospects of severe curtailment in production. The auto industry's reaction to the probability of curtailment, use of substitute materials and forced changes in production methods was mapped out in "Assembly Line" columns of April 3, April 17 and June 12. It was pointed out then that the industry expected, even advocated, curtailment below the peacetime level of production but could see no economic or military advantage in premature cutting down on automobile assemblies. Its attitude was "business-as-long-as-you-can." It has changed not at all from that viewpoint.

In its participation in the defense program it has been unstinting and has taken on its full share of every job, including some which because of their nature (for instance, airplane fabrication) were somewhat distasteful and did not fit into the automotive industry's normal capacity.

Quoting one of the industry's leading executives, this column said on April 17 that when curtailment *by edict* was proposed for the industry by Washington, the rallying call of the auto builders would be:

"Tell us what to do and we'll do it; but don't tell us *not* to build automobiles."

Further, within the industry, it has been advocated that conservation of strategic and critical materials should be encouraged by permitting manufacturers to participate in whatever savings they can effect, or by giving credit for metal savings that are effected in each plant. Since it is immaterial how a quantity of nickel is used—as long as the quantity itself is greatly lessened from previous amounts—the industry has expressed the belief that, whenever materials are allotted for non-defense use, the exact method of use should not be dictated.

Washington Takes Opposite Sides

All of these points in the industry's philosophy of wartime production are coming to a head, with Washington appearing to take opposite sides on every point.

It is patently a borrowed phrase, but "Whipping Boy No. 1" is the most apt label for the auto industry today. Exactly why the auto manufacturer has been picked out hasn't been made clear by officialdom, but the fact that its size makes it a good target is probably a partial explanation.

Despite the fact that the industry has expected curtailment and agreed with the idea, has not complained at the prospect of even punitively heavy taxation on the product that would lessen its sale, and has undertaken such a heavy share of defense work, there is a fundamental clash going on between the auto industry and officials at Washington. Similarly, in the matter of price freezing there is a clash that does not end when the purely defense phases have been discussed. The clash is one in which other manufacturing industry does have an interest.

The leading advocates of radical curtailment of automobile manufacturing have already convicted themselves of not knowing what it is all about. Since last fall Secretary Knox has been known as the spearhead of the drive to halt auto production. His goal, even then, was to halt production completely. There is no need to answer that one. If the auto plants had been closed last September, when he advocated it, nearly 500,000 men would have been thrown out of work in automobile and parts plants and thousands of others who make their living directly, or indirectly, out of automobiles would have landed on the welfare, too.

Hopes for a Natural Curtailment

When defense production is "ready to roll"—and in the Detroit area that stage will not be reached until next fall—the absorption of material will provide the natural curtailment which the industry here has advocated. And when those materials do begin to flow into defense plants, all the men thrown out of automobile jobs will be available for defense jobs.

This point has been pounded home by William S. Knudsen frequently, according to Washington interviews, and Detroiters believe that he adequately understands the auto industry viewpoint, as well as the needs of the defense program. It was through his efforts that the industry last fall brought forth its so-called subjugation resolution and that it has voluntarily agreed to a 20 per cent curtailment of production.

What the industry expects to see—and hopes to see—is this natural curtailment. It will not be surprised or disappointed when sheet and strip making capacity in the steel industry begins to produce ship plate, or when steel ingots go into ordnance steel and auto workers start making shells, because the changeover will be accomplished in an orderly manner. A spokesman who represents a large part of the industry puts it this way:

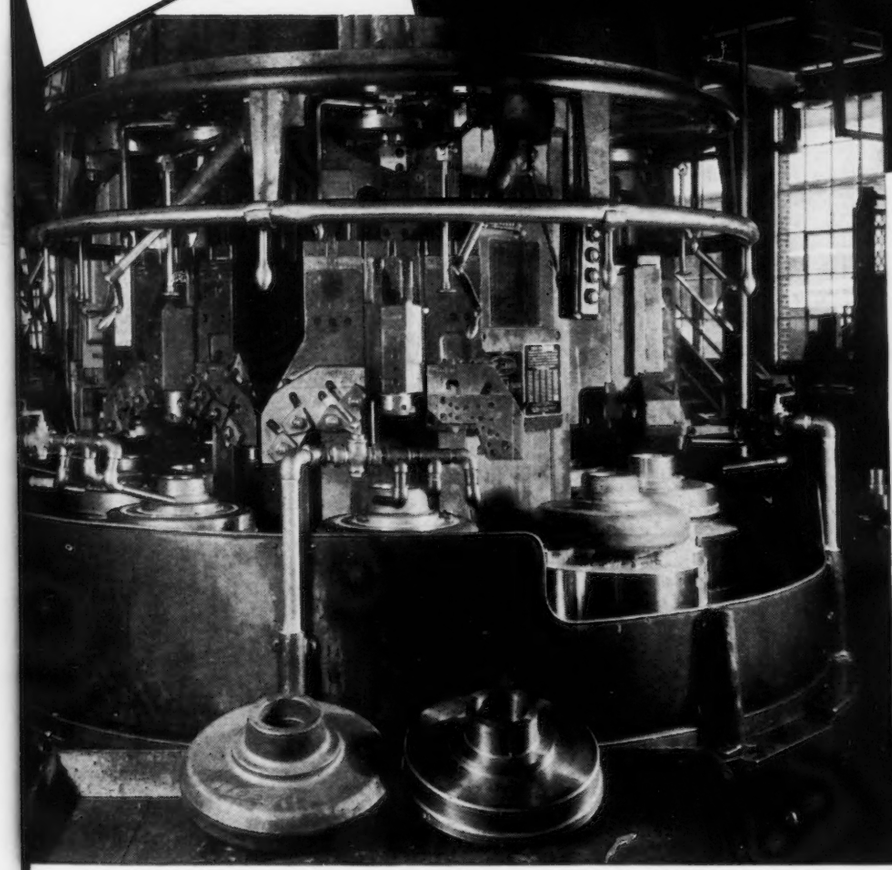
The Approved Way to Handle this

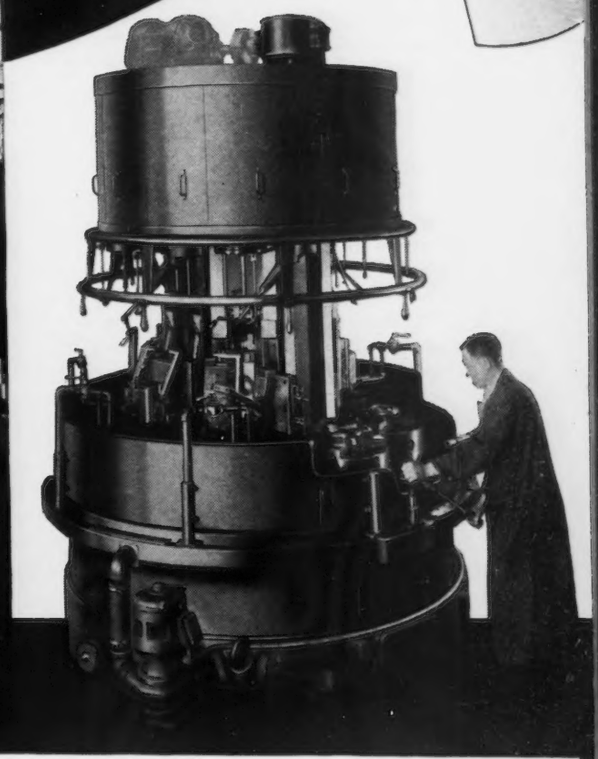
REDUCTION DRIVING GEAR
16"-8 SPT. TYPE "D" MULT-AU-MATIC
3 CHUCKINGS
MAT'L CHR MOLY ALUM. STEEL
CUTTING TOOLS HIGH SPEED STEEL
45 R.P.M. AVERAGE CUTTING SPEED

1ST CHUCKING - ROUGHING
ROUGH - A-B-C-D-E-F-G-H-I-J.
TIME = 13'-29" PROD. @ 85% EFF = 3.8 Pc's

2ND CHUCKING
ROUGH & FINISH - K-L-M-N-O-P
TIME 11'-36" PROD. @ 85% EFF = 4.4 Pc's

3RD CHUCKING - TIME 11'-52"
FINISH - A-B-C-D-E-F-G-H-I-J
PROD. @ 85% EFF = 4.3 Pc's





Close-up of first chucking operation

THE PROBLEM The blueprint tells the story. 16 separate and distinct surfaces to be finished on this chrome moly. alum. steel airplane engine reduction driving gear—*Rapid and Extremely accurate production vital.*

THE SOLUTION 3 chuckings on Bullard Type "D" 16" 8-spindle Mult-Au-Matic. The approved tool layout called for dividing the total roughing and finishing cutting operations between 72 tools on 21 different working stations.

RESULT These parts are being accurately turned out at an average rate of one every 15 minutes—a fraction of the former time.

BULLARD

The Tougher the Job, the More Bullard Can Help You

THE BULLARD COMPANY

BRIDGEPORT, CONNECTICUT

"The industry's planners and schedule makers have only one interest, and *that is an orderly transition from auto output to full defense production.*"

In the matter of price freezing, Chrysler Corp. has made the first official and public reply to Leon Henderson in a statement issued June 26. For every industry engaged in handling non-defense products this declaration by Chrysler is of extreme importance. It follows:

"Mr. Henderson has a very difficult undertaking and we appreciate his problem. To control prices at all successfully in this industry it is necessary, as he suggests, to include manufacturers' prices, dealers' prices, and trade-in values. In addition it is necessary to go back to the costs of labor and material prices, suppliers' operations and prices they in turn have to meet. There should be do discrimination as between industries or companies within an industry, nor should there be any favored group.

"We think it is only fair, however, that in the light of Mr. Henderson's statement we should make two things clear: First, the fact as to our extensive cooperation with the government on defense matters and, second, the facts as to the price increase which we were asked to rescind.

"Our record of cooperation with the government in the defense program is one that we are proud of. Ever since the defense program was begun, we have taken a willing, active and substantial part in it. We forecast and advocated restriction of automobile production for civilian use. We have accepted heavy defense responsibilities and are prosecuting them vigorously. The tank arsenal speaks for itself. Since last October, and without any contract, we have paid rent on a huge plant which we are preparing for producing nose and center fuselage sections of Martin B-26 bombers.

"The Army and Navy are enthusiastic about our work on the Bofors anti-aircraft gun, on which sections of all of our Detroit plants will be engaged. Last summer we advanced Army truck production 60 days in order to accommodate the Army in its maneuvers in the South. And to equip the Army with trained technicians, we ran at our own expense a school to train officers and enlisted men to handle and service these vehicles. On our initiative we are developing a 2000 hp. airplane engine, a new type of landing gear and a new type of marine propulsion apparatus for cargo boats.

"In the year ending May 31, 1941, we delivered to the government $31,666,171 worth of finished products—trucks and other army vehicles, repair and replacement parts for them, cartridge cases, bomb nose fuses, field kitchens and space heaters. On this entire business we made $13,295, a profit of one-twenty-fifth of 1 per cent.

"In view of our unstinted cooperation with the government on these and other defense activities, as well as the economic justification of the small price increases which we made, we naturally feel deeply the accusation that we refused to cooperate with the Office of Price Administration and Civilian Supply. We think it unfortunate that for the first time in our dealings with the government agencies, because of the terms proposed, namely, complete withdrawal of our recent price increases, cooperation could not also be realized with the Office of Price Administration and Civilian Supply in this instance.

"Chrysler Corp. has at no time attempted to disregard the work of the Office of Price Administration and Civilian Supply and this present price increase was made without any knowledge of any communications or expressions of OPACS on the subject of automobile prices.

"Recognizing the practical problem confronting them, and in a desire to be helpful in meeting it, we did offer to cooperate and to make a concession from our announced prices. We said frankly that we were willing to do this if it would help them in their broad problem.

"On June 1 the corporation's payrolls were increased 8 per cent and last December they were increased 2 per cent. Prices on the current models were set last September. We have had two increases in labor and many increases in material, tools and supplies since then.

"The effect of these various payroll and other increases caused an estimated increase in the cost of these cars of $27.75—equal to 4.89 per cent of the cost of the car.

"On June 4 the corporation increased the prices of its domestic passenger cars by 4⅛ per cent which added to the corporation's income before taxes, $26.62 per car.

"For the last 12 months on which the corporation has figures, namely April 1, 1940, to March 31, 1941, the corporation's net profits after taxes on its domestic passenger car business amounted to $30.47 per car or 4.41 per cent of the sale price of the car.

"The $27.55 increase mentioned above, coming almost entirely since the turn of the year, is significant when compared with the $30.47 profit.

"So far as last year's profits are concerned, to which reference was made by OPACS, it is true that they amounted to $37,802,000. In considering them, however, it is interesting also to note that during the period in which they were earned this corporation paid $53,177,000 in taxes, $137,000,728 in wages and salaries and $453,596,000 to other businesses selling us materials for our cars and who in their turn paid wages and taxes. Furthermore, from these earnings $23,931,000 was paid to the stockholders in dividends, the balance remaining invested in the business to finance its future growth and operations. Our 55,000 stockholders received about $440 apiece for the year on the average.

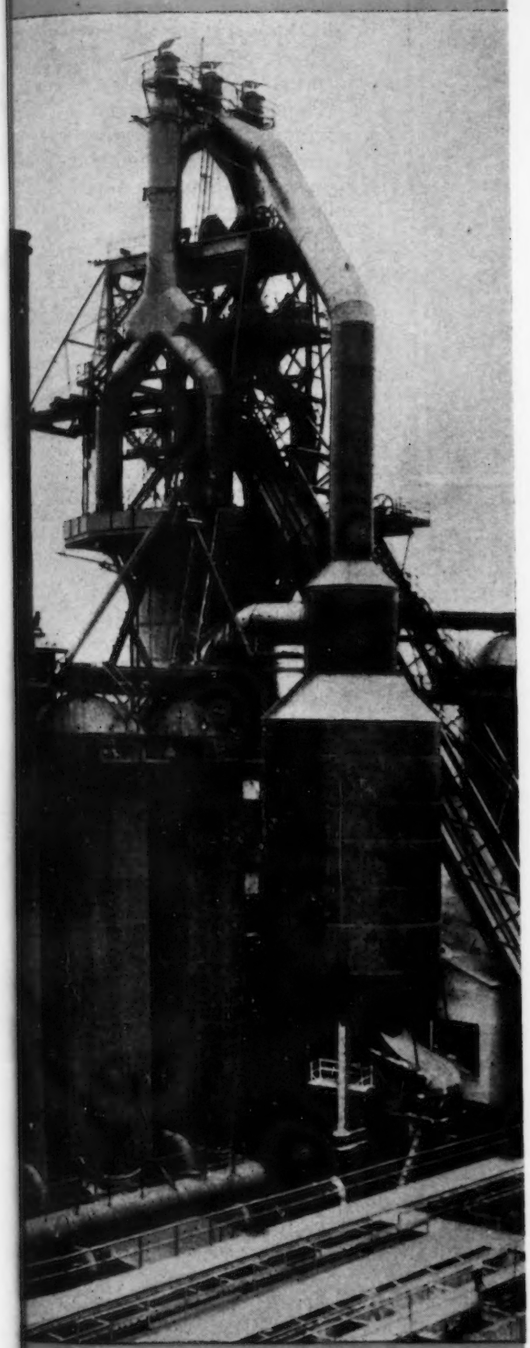
"The automobile industry, which is being restricted in its output for civilian use and is being subjected to extraordinary costs in undertaking unusual production for defense should not be compared with industries which are increasing their production of their usual products. There are also marked differences between an industry making highly fabricated products from divers materials drawn from all parts of the country, and an industry whose products are derived from basic raw materials such as ore, cotton, wool, oil, etc.

"We regret earnestly that Mr. Henderson's office thought it necessary from their viewpoint to use our situation as they did, but we hope this episode, unfortunate as it is to us, helps to bring about sound price policies generally.

"This incident will in no way affect our continued effort to cooperate with them and all other Government Agencies engaged in promoting national defense."

FAST ACTION!

McKee gives you more speed in increasing your plant capacity



FAST action is the first essential in increasing your facilities for iron and steel output.

In these days of uncertain material and labor costs it is more than ever necessary for you to rely on the integrity of the company with whom you do business. Under the circumstances the question of *who* will build your plant requires your first and most important decision.

Contracts in increasing number are being placed with Arthur G. McKee & Company by iron and steel men who have complete confidence in this organization to do an efficient job in the *shortest possible time* and at *lowest possible cost.* That this confidence is justified is indicated by the past record of the McKee organization in over a third of a century of service to the iron and steel industry throughout the world.

McKee customers have benefited by their confidence in us in the saving of valuable time ordinarily lost on negotiations.

McKee can give you fast action by duplicating much of the design for modern successful plants recently completed by us. This saves engineering time and enables us to order material before detailed engineering is completed, thus reducing delivery delays to a minimum.

The McKee organization will give you more speed in engineering and construction to meet *today's* demands—but equally important, McKee will give you sound engineering with an eye to the readjustment problems of the *future.*

Arthur G. McKee & Company

Engineers and Contractors

2300 CHESTER AVENUE • CLEVELAND, OHIO

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Washington

BY L. W. MOFFETT
Washington Editor

• Biddle's statement on oil industry's immunity from anti-trust action considered an important "go-ahead" signal . . . Oil industry lawyers, however, remembering Madison indictments, fear "too much informality" in new setup.

WASHINGTON—In the hurly-burly of the multiplicity of meetings in Washington on defense, a far-reaching statement by Acting Attorney General Francis Biddle on industry immunity from anti-trust action has received but little publicity. Mr. Biddle has given an even bigger go ahead sign than that flashed early in May (*The Iron Age*, May 8, pages 118-119) by Attorney General Robert H. Jackson, which made possible the reorganization of the OPM on an industry - by - industry basis.

Mr. Biddle set forth the liberalized Department of Justice policy at the recent conference of oil industry leaders held with Oil Coordinator Harold L. Ickes. Still feeling the sting of the Madison anti-trust cases that prosecuted them for having only done what they did at government request under the NRA, the oil industry wanted to make certain that they would not again be made the victims of prosecution for carrying out a government-proposed defense program by co-operating with Mr. Ickes.

Mr. Ickes, sharp-tongued critic of industry, anxiously wants to regain the oil industry's confidence just at this time. Hence he took the initiative in seeking the safety of the industry from anti-trust prosecution and obviously any immunity given that industry applies to all industry and therefore the Biddle statement gives added government approval to industry in connection with the OPM reorganization scheme.

Mr. Biddle approved Mr. Ickes' proposal that all recommendations or directions of the oil coordinator to the oil industry be put in writing and published in the official government publication—The Federal Register. Just as the OPM reorganization provides for industries generally, the Ickes plan calls for the setting up of advisory committees for group rather than individual company action.

Ickes to Make Recommendations

Under the agreement Mr. Ickes will make recommendations to the Department of Justice before they are finally carried out. This is to be done so that, in the words of Mr. Biddle "I could give our assurance that any recommendations which seemed advisable when they were determined, either were or were not proper, so that after assurance was given, there could be no question that you in the (oil) industry could go on to carry them out without any fear or feeling that you might run into a snag. I think that is essentially important, so as to have your complete confidence in us and ours in you."

"Admirable" was the word Mr. Biddle used in referring to Mr. Ickes suggestion that before taking any specific action with respect to the industry, the Department of Justice consult and discuss the matter with him in order to determine where there is a field for discretion and how it should be best exercised for the interests of the country.

Though the broad immunity policy indicates assurance of wide cooperation between the industry and Government in the defense program, some oil industry lawyers have not completely shed skepticism. One point they make is that there is nothing in Mr. Ickes letter to Mr. Biddle which specifically states that, before the coordinator's recommendation or direction to the oil industry is published in The Federal Register, it will be submitted to the Department of Justice for clearance. Criticism was made also that there is "too much informality" in the procedure for approving oil companies' group activity under the oil code which, it was concluded, led to indictments at Madison, Wis.

However, the Biddle letter is held to buttress even more than the Jackson assurance the position of industry under the new OPM set-up which saw the Steel Industry Defense Committee begin active cooperation with the defense agency.

↓ ↓ ↓

Washington

• • • **The Office of Production** Management, succumbing in part to strong Administration pressure to attempt a reorganization in the interest of greater operating efficiency, last week announced the establishment of industry advisory committees and commodity sections within its framework. At the same time the agency shied away from a more drastic reorganization and retained its top personnel intact.

The OPM publicized these two major objectives in instituting the streamlined plan:

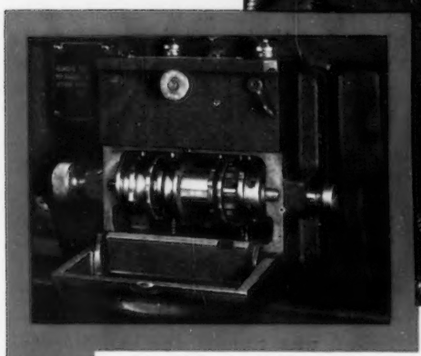
1. A close and unified working relationship between members of the several divisions concerned with the same commodity or material.

2. Efficient liaison between defense agencies and industry.

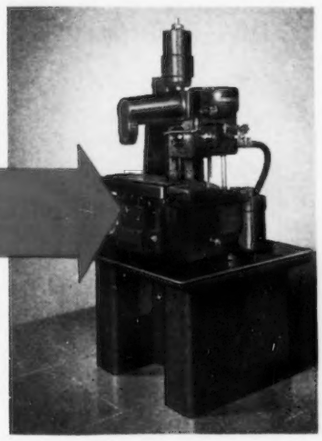
These objectives would be brought about under a plan designed to permit each major industry to deal with a single division of OPM through a commodity section in lieu of going in turn to the production,

You Don't Need a Toolmaker

TO RUN AN O-8 MILLER



Above: Boss of the feed cycles. Cycle selectors may be changed in a minute or two



CINCINNATI No. O-8 Plain Automatic Milling Machine with automatic rise and fall spindle carrier

WHEN you find it difficult to hire toolmakers and first class machine operators, then you appreciate machine tools having that intangible quality "built in skill", coupled with as many automatic features as compatible with your production requirements. These two factors—both of which are prominent in CINCINNATI O-8 Millers—go a long way towards keeping your assembly line running smoothly.

In the illustration above, the operator is milling slots in adding machine type. After loading the magazine holding device (it accommodates 20 parts) and clamping the fixture, there's only one thing for her to do—flip the cycle starting lever. The machine automatically goes through the cutting cycle, returning the table to the starting point.

The complete cycle requires only .67 minutes, production depending largely upon the rapidity of unloading and loading the magazine. And—accuracy within .001" is easily maintained.

This machine is not a single purpose installation — far from it. By merely changing the cycle selector (a matter of a minute or two), almost any conceivable feed cycle can be obtained.

Write for catalog M-828. It contains complete description and specifications for CINCINNATI No. O-8 Plain Automatic Milling Machines.

CINCINNATI

THE CINCINNATI MILLING MACHINE CO. CINCINNATI, OHIO, U.S.A.

TOOL ROOM AND MANUFACTURING MILLING MACHINES . . . SURFACE BROACHING MACHINES . . . DIE SINKING MACHINES

priorities, and purchases division. The industry advisory committees, OPM said, will enable the Office of Production Management to discuss problems of a particular industry with a group selected by that industry to represent it.

Reorganization is not a new experience for the OPM. Indeed, life to many members of its staff, particularly those who first came to Washington to work under the National Defense Advisory Commission, is just one reorganization after another. Few if any members of the staff look upon the present shake-up as a reorganization to end all reorganizations.

The latest stage reached in the transition leaves the three division directors in their original staff positions. In addition, each will be in charge of a group of commodity sections, in which their special problems will be regarded as of paramount importance.

Director of Production John D. Biggers, for example, will head the commodity section dealing with steel, aluminum, magnesium, paper, pulp and chemicals. Under his wing will remain the supervision of the aircraft, ordnance and tools branch, as well as the ship construction and supply branch.

Director of Purchases Donald M. Nelson will take on his shoulders primary responsibility for sections where purchasing problems are of major importance.

Director of Priorities Edward R. Stettinius, Jr., will supervise the functions of commodity sections in which importation or allocation problems are outstanding as they are in rubber, copper and zinc. Mr. Stettinius will continue to exercise statutory powers over priority matters. All contemplated priority actions, wherever they originate in the OPM, will be subject to review, approval and issuance by him.

The OPM emphasized that each division director will have two main responsibilities—first as director of regular staff functions of his particular division, and second, as head of specified commodity sections.

It gave this illustration of how the new streamlining will permit the agency to function:

"Steel will be handled in a commodity section under Mr. Biggers. When any important question on steel, falling within the jurisdiction of the OPM, arises, the chief of the steel commodity section will have the opportunity to consider suggestions and receive advice from the defense industry advisory committee on steel before decision is reached."

Similarly, it was explained, OPM decisions relating to copper will be made by chief of the commodity section dealing with copper, subject to the approval of Mr. Stettinius, since the copper section will be under his supervision.

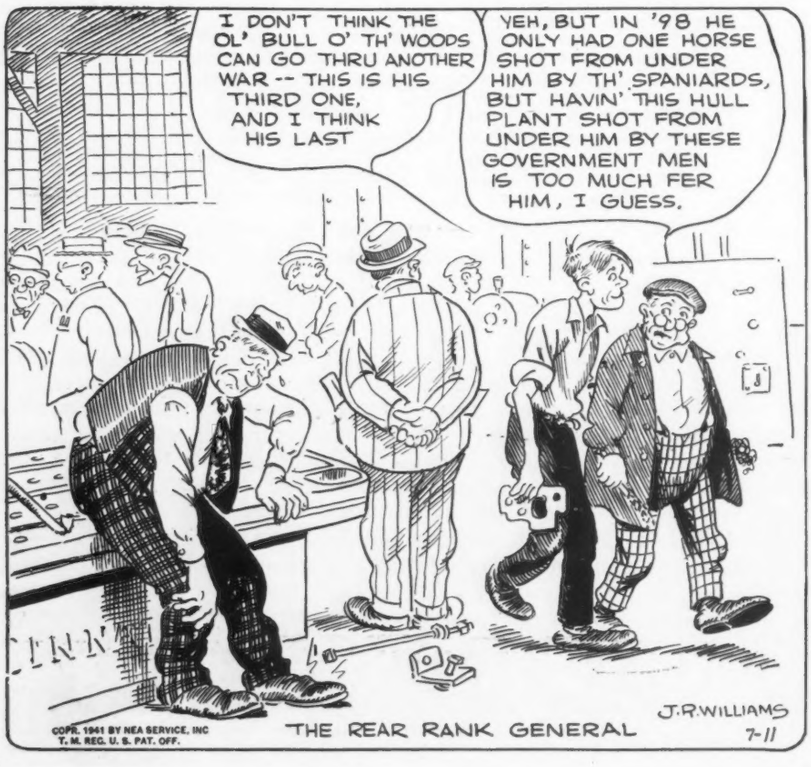
In short, all problems which would normally be thrown in the lap of OPM in any one commodity will be routed centrally within the operating unit, or commodity section for that material; and decisions will be made by the section chief at that point, subject to approval of the director in charge of that section.

The industry advisory committees will act in an advisory capacity under a policy on which the Justice Department's antitrust division placed its stamp of approval April 29. One of the first advisory committees to be established was named for the electrical industry to give immediate consideration to problems involving conservation, substitution of materials, simplified practice, revision of specifications, raw material supply, allocation of production, and inventory control.

The new commodity sections—there will be one for steel, one for zinc and others—will be completely centralized units in which all OPM headaches relating to the commodities concerned can be handled. As an illustration, all questions on steel, whether on priority, production or purchasing problems, will be considered and handled in the steel section under the supervision of a commodity section chief. All defense agencies, including the various commodity sections, may make use of the defense industry advisory committees to obtain information and advice bearing on their respective problems.

A central clearing house for the defense industry advisory committees has been set up under Sidney J. Weinberg.

THE BULL OF THE WOODS — BY J. R. WILLIAMS


I DON'T THINK THE OL' BULL O' TH' WOODS CAN GO THRU ANOTHER WAR -- THIS IS HIS THIRD ONE, AND I THINK HIS LAST
YEH, BUT IN '98 HE ONLY HAD ONE HORSE SHOT FROM UNDER HIM BY TH' SPANIARDS, BUT HAVIN' THIS HULL PLANT SHOT FROM UNDER HIM BY THESE GOVERNMENT MEN IS TOO MUCH FER HIM, I GUESS.
J.R.WILLIAMS
7-11
COPR. 1941 BY NEA SERVICE, INC T. M. REG. U. S. PAT. OFF.
THE REAR RANK GENERAL

Save WEEKS of Delivery Time on Many of Your CARBOLOY TOOL REQUIREMENTS

. . . and also reduce your tool cost!

Vital Facts About Carboloy STANDARD STOCK Tools & Tips!

Here are three ways in which you can obtain your Carboloy tool requirements in the fastest, most efficient and most economical way under present conditions:

1 *Use Carboloy Standard Stock Tools.* These are made in "mass production" quantities and are stocked and shipped by the thousands each week. You always get them faster than "specials". A check-up of your Carboloy tool needs will reveal many that can be easily changed over to standards. You save weeks of delivery time.

2 *Use Carboloy Standard Blanks.* These, too, are made in "mass production" quantities. If a thorough check reveals that you can't use Carboloy Standard tools (most users find they can), ask your tool designers to incorporate Carboloy Standard Blanks in their special tools whenever possible. This saves production time.

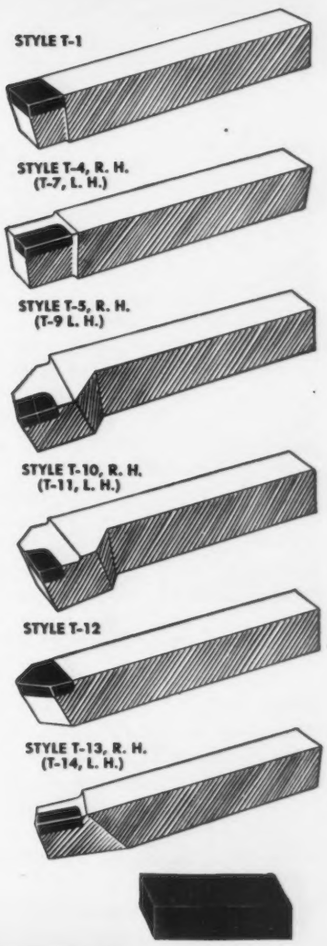
3 *For emergency tooling braze your own Carboloy tools.* Many users keep a supply of Carboloy Standard Blanks ready for emergency tooling and repairs. Many, too, braze ALL their own Carboloy tools.

Carboloy Standard Tools consist of the 10 styles shown at right, suitable for, or adaptable to, 60% to 80% of all turning, facing, boring applications. In cases where these tools, as supplied, do not exactly meet design requirements, you will find your tool room can usually grind variations to meet a wide range of special angles and shapes.

Generously sized Carboloy tips, plus modern rapid Carboloy grinding technique, make this procedure practical and fast. By this method you can take advantage of the greater economy and faster delivery of Carboloy Standard Tools—often WEEKS faster than "specials"!

Carboloy Standard Blanks, too, save time and money. Two styles (shown lower right) available in 65 sizes, three grades.

A few minutes spent to get the facts about Carboloy Standard Stock Tools and Blanks may save you weeks of delivery time. Send for Catalog GT-129.



Standard Blanks in 65 Sizes 2 Styles, 3 Grades

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CARBOLOY STANDARD TOOLS & TIPS

"You ALWAYS Get Standards FASTER Than 'Specials'"

CATALOG GT-129

SEND FOR FREE CATALOG

San Francisco

• • • **Not the least of** problems raised by projected mill expansion more than doubling Pacific Coast steel capacity is the problem of obtaining sufficient scrap steel to feed the enlarged operation.

Were the entire expansion to be made at tidewater, and were it to be fed entirely by scrap, Pacific Coast scrap producing resources would be entirely inadequate. Thus, the problem is somewhat relieved in that Columbia Steel Co. will add most of its 930,000 tons at Provo, Utah, with pig iron production adjacent, and Colorado Fuel & Iron Corp. will be able to take care of its 250,000 ton increase from its own blast furnaces and from scrap resources of the Rocky Mountain region. Thus, of the 1,556,000 tons to be added in the Western district, somewhat over 300,000 tons will be dependent on Pacific Coast scrap. The bulk of the scrap-dependent operation will be concentrated in California; Bethlehem's one open hearth to be added at Seattle is a minor factor.

No Surplus Brought Out

The present top price for No. 1 heavy melting steel of $14.50 per gross ton is not bringing forth a flow of material in excess of that needed for current operation. The fit between price and supply is not so tight as to entirely stop the circulation, but it is an extremely snug relationship.

With Coast assembling costs higher than in many parts of the country due to longer hauls from outlying districts, and to scattered population, any substantial increase in demand tends to bring strong pressure on price levels. Particularly when marginal sources are tapped, costs tend to rise rapidly.

As has been pointed out, up until last year extensive exports to Japan indicated scrap resources on the Coast about 200,000 tons annually in excess of requirements of Coast mills operating at capacity. It is essential to note, however, that this theoretical excess is brought into being only at a price scale materially higher than the present OPACS figures. For instance, 1939 customs figures show that an average price of $15.58 per gross ton prevailed for all scrap exported from Pacific Coast customs districts. The type of material exported is not classified, but it is safe to assume that by no means all of it was of No. 1 standard. In fact, inasmuch as almost 75 per cent of available West Coast scrap is of No. 2 quality no doubt much of the material fell in that or a lower classification.

• Obtaining of sufficient scrap one problem in expanding of West Coast steel capacity . . . Higher assembly costs will bring strong pressure on price levels . . . Southern California aircraft plants want district OPM office.

This is not a prediction that scrap prices will have to be raised at present Pacific Coast basing points to bring forth an adequate amount to supply projected expansion, nor is it a brief for such a price raise.

Junked Cars to be Larger Source

Unverified reports persist that waste metal material is being held off the market at Pacific Coast consuming centers in anticipation of such a price rise. Unless there is a decided change of heart on the part of Administrator Leon Henderson, this alone would be enough to keep the price where it is. A more likely means of drawing remote scrap to market would be a modification of Price Schedule No. 4 raising shipping point prices, or by some similar means to provide for added freight. Such a modification seems much more likely than one permitting a higher price for scrap originating in metropolitan centers near points of consumption.

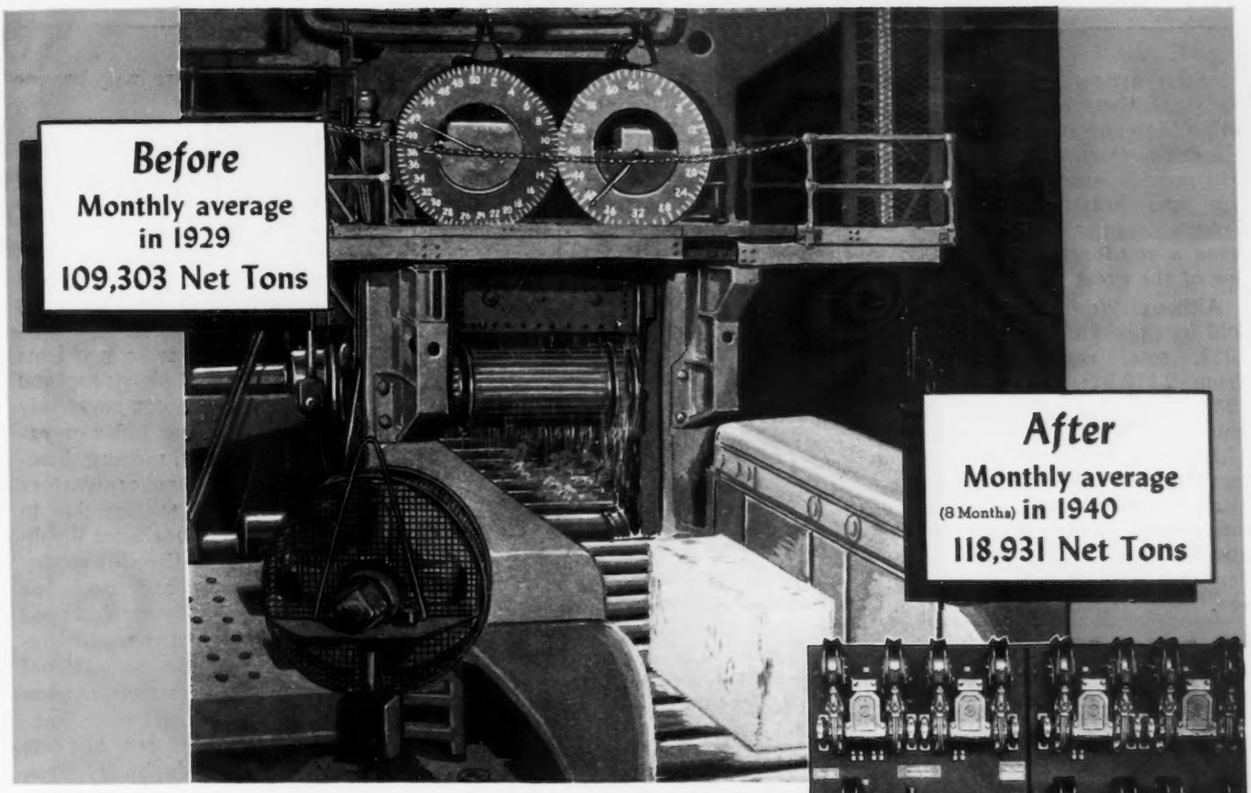
If past experience can be taken as a criterion, junked automobiles should provide a much greater amount of scrap during the next two years. In California, the average life of a motor car is calculated to be from six and a half to seven years under normal conditions. By checking back to new car sales in the state in past years, it is possible to predict in some measure the scrap supply of the future, inasmuch as automobiles are by far the largest source of scrap material in this section of the country.

Rapidly increasing new automobile sales during the climb out of the depression presage an increased scrap supply for at least the next two years. Passenger and commercial car sales in California in 1932 numbered 81,340; 1933, 110,642; 1934, 136,147; 1935, 225,747; 1936, 289,120; 1937, 284,174; and 1938, 172,575.

Should Drop in 1946

The increase in motor car sales of 89,600 in 1935 over 1934 would indicate a bulge in available scrap material in 1942. The increase in 1936 over 1935 of 63,373 vehicles augurs a still greater supply in 1943. In 1944, the available supply should level off, and in 1946 take a sharp drop. At least, just as the new furnaces go into operation, automobile scrap should be on the rise.

Another barometer of automotive scrap supply is total state automobile registration figures reflecting migration to California. Although the hordes of dust bowlers received about as warm a welcome as a swarm of locusts at the time



MODERNIZATION

ups Production over 9600 Tons per month

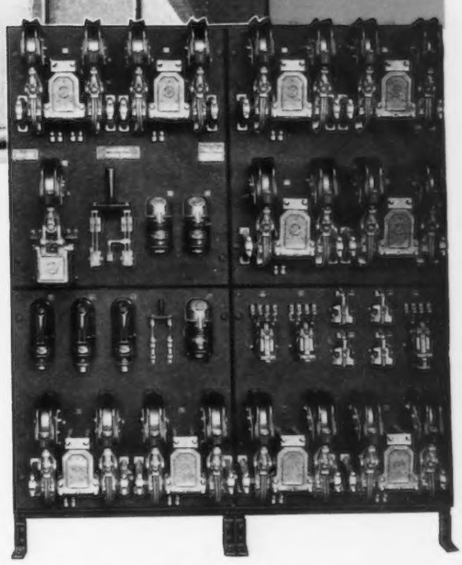
IN THE plant of a prominent steel company, the 44" blooming mill set a record of 109,303 tons monthly average in 1929. Modernization a short time ago increased production to approximately 118,931 tons monthly average . . . or a gain of 9628 tons per month.

Modernization consisted of new open hearths, increased soaking pit capacity, new heating practice as well as mechanical and electrical improvements on the 44" mill. New EC&M Controllers were applied on all auxiliary drives—tables, sideguards, screwdown, manipulators, etc.—of this mill.

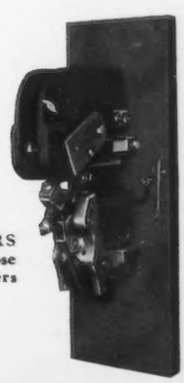
Contributing to the increased production are the EC&M LINE-ARC Contactors used on the new mill controllers. The arms of these contactors are 50% *lighter in weight* and *operate almost twice as fast as previous contactors.* With rolled steel for the magnetic circuit and light-weight alloys for the moving parts, these LINE-ARC Controllers are *lightning fast* in response to the operator's manipulation of the master switch.

Combined with Time-Current (load-controlled) Acceleration Relays, EC&M LINE-ARC Contactor Controllers are the logical choice for industry's direct current motor drives. Ask for Bulletin 925 describing them. The Electric Controller & Mfg. Co., 2700 East 79th St., Cleveland, Ohio.

THE ELECTRIC CONTROLLER & MFG. CO. E&M CLEVELAND, OHIO



Typical EC&M Mill Auxiliary Magnetic Controller



NEW CONTACTORS
almost twice as fast as those on previous controllers

FOR FAST OPERATION—Specify EC&M LINE-ARC CONTACTOR CONTROL

of their arrival, no one can deny but that their vehicles eventually will add to the state's scrap supply. No doubt even the Joads' Hudson will provide scrap material for the new open hearths to be built for defense, unless it already has become a reinforcing bar or two in one of the great power dams.

Although fewer new cars were sold in California in 1937 than in 1936, total registration jumped from 2,270,921 to 2,657,233. In 1938 new car sales dropped 112,000, but total registration increased 37,232. In 1939 total registration increased 113,108. This would indicate that a substantial amount of scrap material for the new California furnaces came to the state under its own power several years ago.

Furnaces Top New Region

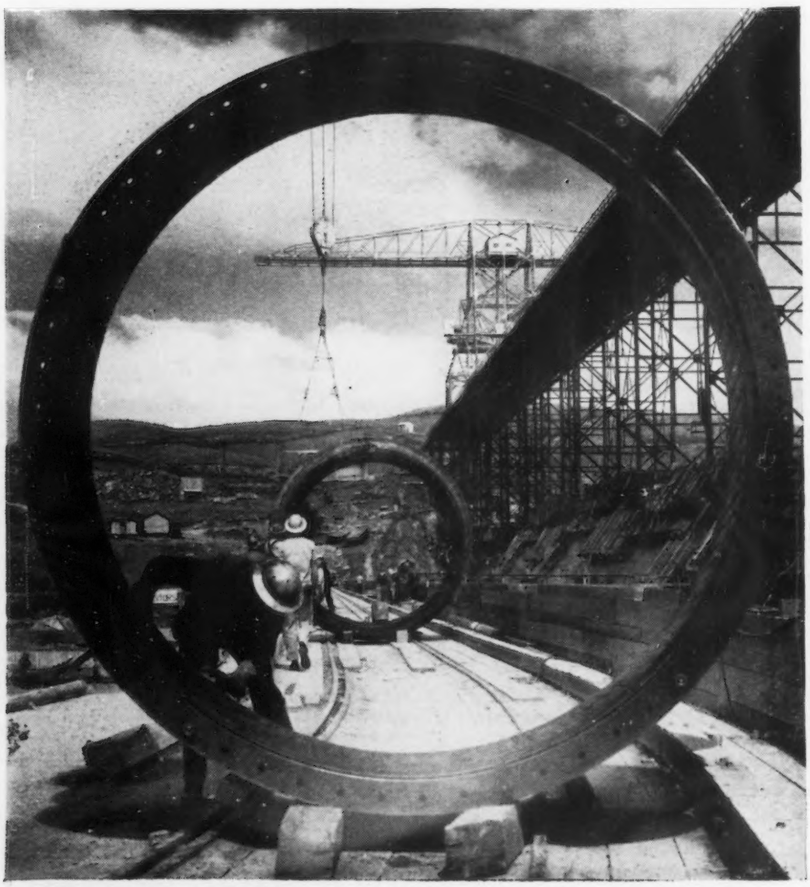
Open hearth furnaces to be built by Columbia Steel Co. at Provo, Utah, will draw their scrap from a comparatively untouched region. Heretofore, Colorado Fuel & Iron Corp. has been the only large scrap consumer in the Rocky Mountain area. The assembly area for the new Columbia operation should not overlap with CFI, and relatively little trouble should be experienced in gathering scrap, particularly as a much larger proportion of pig iron will be used than has been common on the Coast.

Should any serious shortage of scrap appear on the Pacific Coast, pig iron from Provo could be called upon to fill the gap, despite higher cost and the competitive implication involved.

If average automobile life is prolonged by a shortage of new cars in the next few years or if sharply increased excise taxes force car owners to retain old vehicles, these calculations will go askew, and the scrap supply increase will become problematical.

Direct Authority Asked

Southern California aircraft parts manufacturers are calling loudly for a direct and authoritative officer of the OPM to be located in their area. Parts makers declare that they have no local authority from which they can obtain definite decisions in problems relating to material shortages and priorities. Even a comparatively small plant employing 100 men experiences difficulty in doing business with several prime contractors following different policies due to amorphous instructions from Washington. Direct authoritative information, advice, and decisions from a local authority would speed part production and prevent unnecessary parts losses to national defense, the parts manufacturers say. A local OPM authority, handling this section of the aircraft program, could undoubtedly iron out some of the production bumps among the large number of independent producers.



SHACKLES FOR A RIVER: Two of the bell mouths for the permanent outlet pipes for the San Joaquin River at Friant Dam (Cal.) are being inspected by workmen before being installed in the upstream face of the dam.

Graving Dock to be Built

At Seattle, Todd-Seattle Dry Docks will build an intermediate sized graving dock capable of accommodating destroyers or C-1 cargo boats. Further expansion to Coast repair facilities are anticipated in view of the expanding building program.

Growth of the Pacific Coast as a steel exporting territotry, already greatly stimulated in the past year by demands from the south Pacific, increases the industry's interest in shipping facilities. It is doubtful whether any great increase in shipments to Russia, particularly in American boats, will be made from the Pacific Coast.

Vultee Aircraft, Inc., reports that May deliveries of Basic Trainers to the U. S. Army Air Corps exceeded contract schedule by 83 per cent, the jump being attributed to a new mechanized assembly line recently placed in operation at the Vultee Field Division in southern California. This is the third consecutive month in which deliveries have bettered Air Corps contract schedule, the excess in the previous month having been 30 per cent in March, and 55 per cent in April.

Experience of Years

STORED UP

in Helpful Literature...

The pressing demands of the defense program call for the employment of every skill and facility at the disposal of the metal working industries.

Among the resources available is the experience of our technical staff in the solution of problems involving the use of Nickel and its alloys.

This experience has been distilled into helpful literature which deals with the selection, fabrication and uses of these materials. This printed matter is yours for the asking. You are also offered the assistance of our technical staff in solving problems of material arising from the temporary lack of Nickel.

Your inquiries addressed to the Company either for literature or personal consultation will receive prompt attention.

Nickel

THE INTERNATIONAL NICKEL COMPANY, INC. 67 WALL STREET NEW YORK, N. Y.

Fatigue Cracks

BY A.H.DIX

Bench Plug

• • • One of our confreres was recently called to serve on the jury trying a gentleman charged with snuffing out the life of a former Public Enemy No. 1.

Our man was asked by the defense attorney, *"With what publication are you connected?"* When he gave the name of your favorite family journal, the attorney inquired, *"What kind of a publication is that?"* Before our man could answer, the judge interposed, *"I am surprised, Mr. So-and-so, that you should ask that.* THE IRON AGE *is one of the world's best-known trade papers."*

Our man beamed, but the judge proceeded to spoil the whole show by smiling at him benignly and announcing, rather than remarking, *"A McGraw-Hill publication, isn't it?"* It isn't, of course, being one of the stars in the Chilton firmament.

A Mind With But a Single . . .

• • • *Emerson Findley, your favorite family journal's altitudinous and erudite Central Western Manager, a former Latin instructor, sends in this apt phrase, which he picked up the other day, as applied to the individual who has one joke to tell and who tells it endlessly—"a single crack mind."*

Among the Birds and the Bees

• • • We have gone over carefully the tool steel list that has been appearing here serially since May 15, to find if a definite pattern is followed in the naming of brands. But we find there is none. The tool steel makers are fancy free. They name their products after mythological gods and monsters, animals, birds, Greek letters, and Indian tribes.

Among the fabulous characters who have lent their names to tool steels are *Atlas, Hercules, Janus, Minerva, Stentor, Uranus, Orion,* and *Saturn.* Fauna's contributions are *Badger, Lion, Panther, Stag,* and *Tiger. Hawk* is the only member of the feathered fraternity to be honored, although in a pinch you could include the highly heat-resistant *Phoenix.*

Flora have been completely ignored. We cannot find a single *Daisy, Pansy* or *Aspidistra* in the 1500 names, but Indian tribes are in four times, with *Ontario, Mohawk, Seminole,* and, if you will accept a pleasant pun, *Chippaway.*

The half-man, half-fish phylum is represented by *Triton,* and *Centaur* blankets the homo-equine field. The only Greek letter used is *Omega.* Surprisingly, no tool steel is named *Alpha,* although Crucible Steel's *Alva* will fill the gap if you speak with an accent.

The tool steels far outdistance Johnny Walker whiskey in using label colors as brand names. Walker has only two, but the steels run the whole spectrum—*Black Label, Blue Label, Brown, Gold, Gray, Green, Orange, Purple, Red, Silver, White,* and *Yellow Label.* If you should ask us for our favorite tool steel name we wouldn't know. We are torn between *Zip* and *Zip-Zip.*

Although this brief thesis on tool steel nomenclature is probably of slight interest to you, you may wish to know that we will print the complete list in pocket size booklet form and will supply copies at cost, which will be somewhere in the neighborhood of 25c. By next week we ought to know definitely what the price will be and will publish it here.

Saying "No" With a Smile

• • • The world is full of books on how to get orders, but what is badly needed now is one on how to turn down orders diplomatically. Even if the order comes from a company that gave your salesman cavalier treatment when the shoe was on the other foot, it is not wise to follow your inclinations. Being polite may build up complexes, but it pays in the long run.

In the absence of a book on the art of declining orders graciously, each company has developed its own technique, embroidering the general theme, *"We are grateful to you for the order. Although existing demands make it impossible for us to accept it, we thank you for remembering us. Depend upon it that we shall get in touch with you as soon as we are able to supply you."*

The best job of mass-explanation of an oversold condition is, in this page's opinion, being done by the Aluminum Co. of America. In particular the June 12 message, the one entitled, *"Aluminum, Defense and You,"* is a classic example of a beautiful blending of candor and commonsense, simply and persuasively presented.

This advertisement proves that even in the largest companies where matters of published policy are doubtless passed upon by many brass—or should we say aluminum?—hats the edge of a delicate verbal point need not be dulled.

Hangover Haven

• • • Ray Kay, your Southern California reporter, says this sign hangs in a Santa Barbara drugstore window:

TOMATO JUICE, ASPIRIN,
BLACK COFFEE AND SYMPATHY
15 CENTS

Mass Producer

I see by our favorite family journal that the Falk Corp. has taken on a retired railroad man to sort scrap in the plant maintenance department. The items say "he is a father of 70." Shouldn't he be on the production line instead?—W. J. F.

Squawk

See your June 12 issue, page 48:

Nor is there any doubt in the minds of inspectors that the gear boxes that go into one of the world's fastest ships are improperly constructed.

Nor is there any doubt, also, that the copy desk of The Iron Age was asleep in passing this confusing double negative. —Deac.

It sounds all right to us. We read it without stumbling and without groping for the author's meaning. Cancel out the negatives, make it positive, and it is still just as clear—*"There is doubt in the minds of inspectors that the gear boxes . . . are properly constructed."* What's wrong with it, Deac?

To bolster his case Deac submits a sentence from Dorothy Kilgallen's column in the New York Journal-American reporting a night club squabble among New York's gentlefolk:

First blood went to Peggy Hopkins Joyce and it can't be said she didn't pick on someone not her own size.

We will agree that triple negatives are too much for the average brain to handle at one sitting. In this instance you have to read the sentence three or four times and painfully cancel one negative against the other to find whether Peggy gallantly gave away weight, as Billy Conn did, or meanly picked on a bantamweight.

Puzzles

The answer to last week's cerebrum curdler, requiring you to express a value for one-eighth by using the digits from 1 to 9 each once, is this fraction, 9321/74568.

A three-minute solution of this one puts you in the front row of the mentally alert class:

A milkman has a 1½-qt. can full of milk. He wishes to divide his milk into two equal portions. In addition to the 1½-qt. can he has a 5-qt. and a 9-qt. can. How does he make the division without any waste?

Northern HI-LIFT HOISTS

serve manufacturing, storage and shipping operations at less cost

The combination of unusual flexibility, exceptional ease of control and high economy gives the Hi-Lift Hoist a wide usefulness. Sturdy construction makes it always reliable.

The load, large or small, is under the accurate control of the operator. He can lift, carry and spot with precision.

Hi-Lift Hoists are in use in every type of industry—steel mills, automobile plants, foundries, machine shops, tool and die shops, paper mills, structural plants, power plants and many other places.

They are handling dies, castings, machinery, steel, paper, electrical material, automobile bodies and frames, lumber, stone, pipe, etc., at amazingly low costs, and with the high-lift feature are making better use of building space.

The Hi-Lift line is comprehensive —there is an economical unit to meet YOUR needs.

NORTHERN ENGINEERING WORKS
2607 Atwater Street
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Typical Installations of Northern Hi-Lift Hoists In Various Industries

For Your "Production Peace-of-Mind"

DBL HIGH SPEED STEEL

★ **Contains less than one-third as much tungsten as 18-4-1 High Speed Steel.**

★ **Performs as well or better than 18-4-1 in 85-90% of all cases, including those jobs peculiar to defense needs, such as the machining of armor plate.**

★ **Heat-treats and handles in the same equipment, and with the same technique, as 18-4-1 . . . you have nothing new to learn, and no new equipment to buy.**

★ **Requires no coating to control "decarb."**

★ **Costs less than 18-4-1, and is lighter . . . you get more pounds per dollar, and more tools per pound.**

TUNGSTEN restrictions needn't bother you. You can change over from 18-4-1 to DBL High Speed Steel without any headaches, and without losing a single step in your production pace. In fact, you can even gain marked advantages (see the comparison between 18-4-1 and DBL at left).

The only difference between the two in handling methods is that DBL heat-treats at slightly lower temperature than 18-4-1. All you need is the "DBL Blue Sheet", which contains complete information. Send the coupon below for your copy.

Note: A-L "moly-type" High Speed Steels also include grades with lower tungsten content than DBL, as well as "no-tungsten" types—all well established and proved in service. Please make full use of our Mill Service Staff to help you apply these steels to your needs. • Just contact any Company office—ask for Mill Service on Tungsten.

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STEEL CORPORATION — PITTSBURGH, PA.
Tool Steel Division — AL — *Watervliet, N.Y.*

T-20

Allegheny Ludlum Steel Corporation
Oliver Building, Pittsburgh, Penna.
Send me a copy of the "DBL Blue Sheet."

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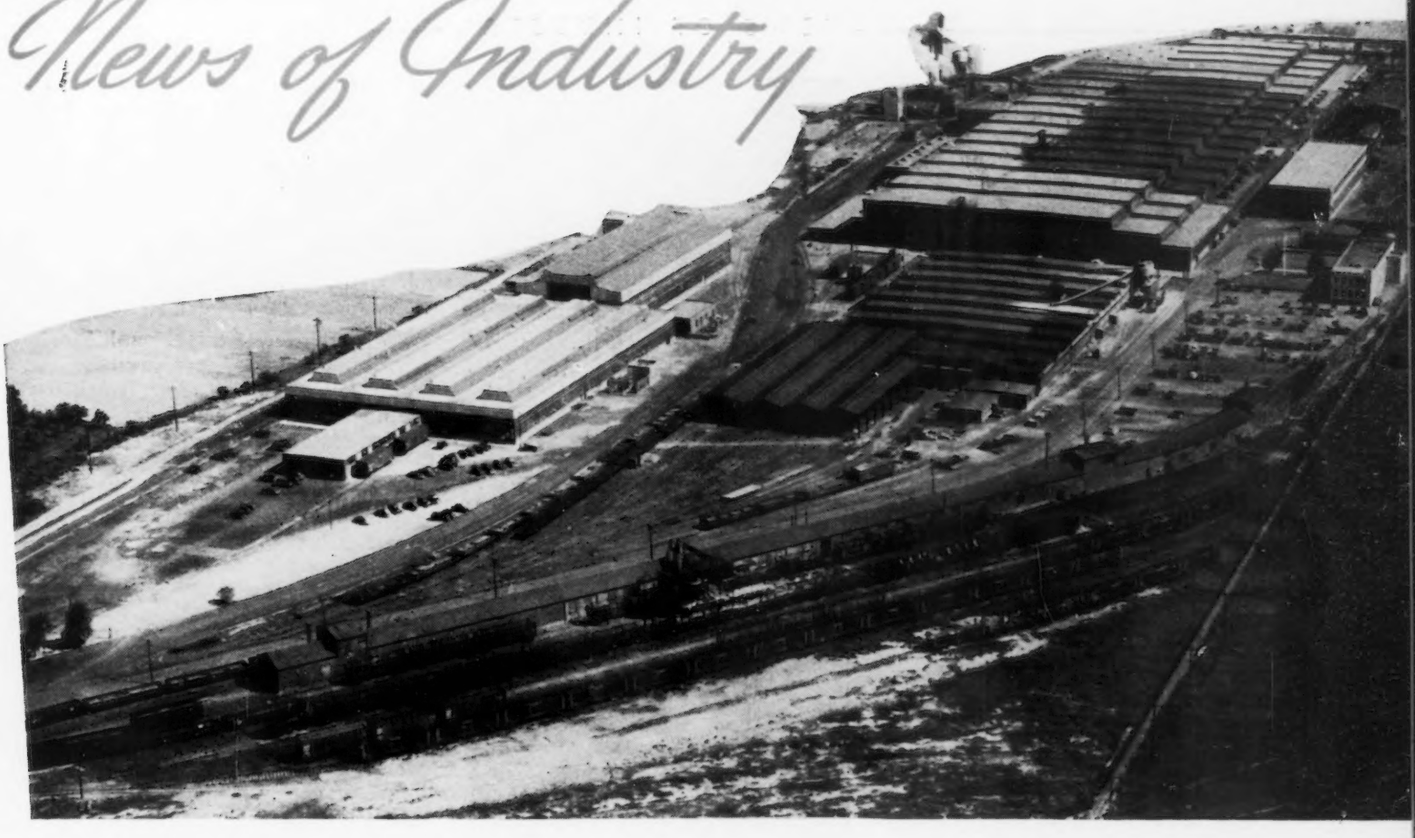
News of Industry



TEST PLANT: This is an air-view (distorted for benefit of visiting bombers) of the controversial National Steel Car Corp. plant at Hamilton, first plant to be taken over by the government in the U. S. or Canada to prevent a loss in war material production.

Seized Canadian Car Plant Headache For Government Manager

° ° °

By JAMES A. ROWAN
Iron Age News Editor

° ° °

Ottawa

• • • **Canada's first experiment** with government operation of an important defense industry—the National Steel Car Corp.'s plant at Hamilton, Ont. — has cooled enough for a close examination.

Just eight weeks ago the Canadian government stepped in to force operation of the SWOC-struck plant so that the Dominion could get the shells it needed to defend itself and aid Britain.

All property rights of the owner of the National Steel Car plant were taken away in a forthright government order which shut out the company's directors and stockholders from any control or supervision over the property. This same strongly-worded order threatened any person interfering with the government controller with punishment up to a $5000 fine and (Mayor Houde of Montreal is already in an internment camp) five years in prison.

This week the Canadian government still manages the Hamilton plant in this first test in North America of a government's right to take over and operate an essential industry and up to now Canadian industrial leaders and labor leaders are not sure how it will work out for them. The Canadian public is satisfied for the moment. What Canada needs and wants most from the Hamilton is shells, and shells, in quantities too great to be set down here, are what they are getting.

Most of the grief in this temporary (and slight) nationalization of one plant of one of the Dominion's largest defense goods manufacturers has fallen on the head of the Government controller, Ernest John Brunning of Westmount, Que. (a glass manufacturer). Practically all of the National Steel Car Co.'s labor troubles have been loaded on him. The National Steel Car management does not have to worry about these troubles, since the solution is up to the government.

First of the problems confronted by Brunning, as representative of the people, was a demand from the SWOC, which had called the strike resulting in the taking over of the Hamilton plant, for a wage scale establishing 62½c. an hour, as in northern steel plants in the United States, and proportionate increases for more highly skilled workmen. Simultaneously, the union asked for establishment of a 48-hr. week with time and a half for overtime and double pay on legal holidays.

This wage demand, Brunning said, was not justified because the average rate per hour paid at the Hamilton plant from Jan. 1 to May 1 of 1941 was 65c., compared

with 50c. in 1929, 51c. in 1927 and 1928 and 53c. in 1939. Overtime rates, including double time for Sundays and holidays, would mean an unwarranted "burden" on the government, Controller Brunning said. (Canada's Department of Labor is proposing freezing of all wages for the duration of the war.)

In declining to meet the union's demands for higher pay, an issue which suffers from lack of public support in view of the $1.30 a day paid the Canadian soldier, Controller Brunning was acting in a variety of capacities: (1) Associate Minister of Munitions and Supply, (2) manager of the Hamilton plant and (3) representative of its biggest customer, the Dominion government.

In this triple capacity, and after appraising all the facts, Mr. Brunning said "no" to the request for higher wages (which had not been a controversial point in the SWOC strike resulting in taking over of the plant). He reminded the union leaders that he had taken care to avoid discrimination and unreasonable dismissal of employees and had rehired some men allegedly unjustifiably dismissed, although "there was some doubt in his mind," he said, as to whether the record of some of the men deserved such treatment.

Controller Brunning then wound up his answer to the union's wage request by declaring that, anyway, the question of union recognition could not be dealt with in view of the fact that the plant is being operated by the government.

Thus the National Steel Car plant seizure, considered by some observers to be the first step in a new move toward public ownership and operation of basic industries which would continue during and after the war, ended its first phase against the problem of whether a union has any rights in bargaining with the public, representing the government, whether, for example, a union has the right to strike against the government.

Some thoughtful Canadian industrialists, studying the workings of the National Steel Car case and noting the decisions of large employers, like Ford, across the border signing agreements with unions giving them powers which they have heretofore opposed, have concluded that perhaps all employers fighting union opposition and possible union domination, should give up everything the unions want and then place the responsibility for the maintenance of orderly collective bargaining and of continued production upon the government.

CANADA'S WAR LEADER: Mackenzie King, Prime Minister of Canada, gets his full share of criticism. His lack of showmanship in telling the U. S. of Canada's war efforts is a cause of grumbling among many Canadians.

Government control of unions is a logical development of this period in which the natural growth of collective bargaining is complicated by the need for full production for defense, they believe.

Meanwhile, the National Steel Car stockholders have been given a statement outlining the infringements of their rights, the illegality of the plant seizure, and a history of the company's war efforts, beginning in 1936 with completion of a shell order for the British government.

It is significant, the car company management noted, that the Dominion government seized the plant "despite the fact that for some time the Canadian Department of Munitions and Supply had not been taking full delivery of other war commodities which we were manufacturing for them, in consequence of which we had accumulated a reserve supply which would have taken care of their requirements for some time to come."

In summarizing its position the National Steel Car management emphasized that:

"The government, in taking over the control of the Hamilton plant, encouraged the public to infer that Canada's war effort was in danger of being seriously retarded by an arbitrary and unreasonable resistance on our part to the CIO-SWOC demands.

"The CIO-SWOC at that time was threatening to call strikes in other Canadian steel plants working on war orders unless the government forced us to submit to their demands (rehire a discharged labor leader).

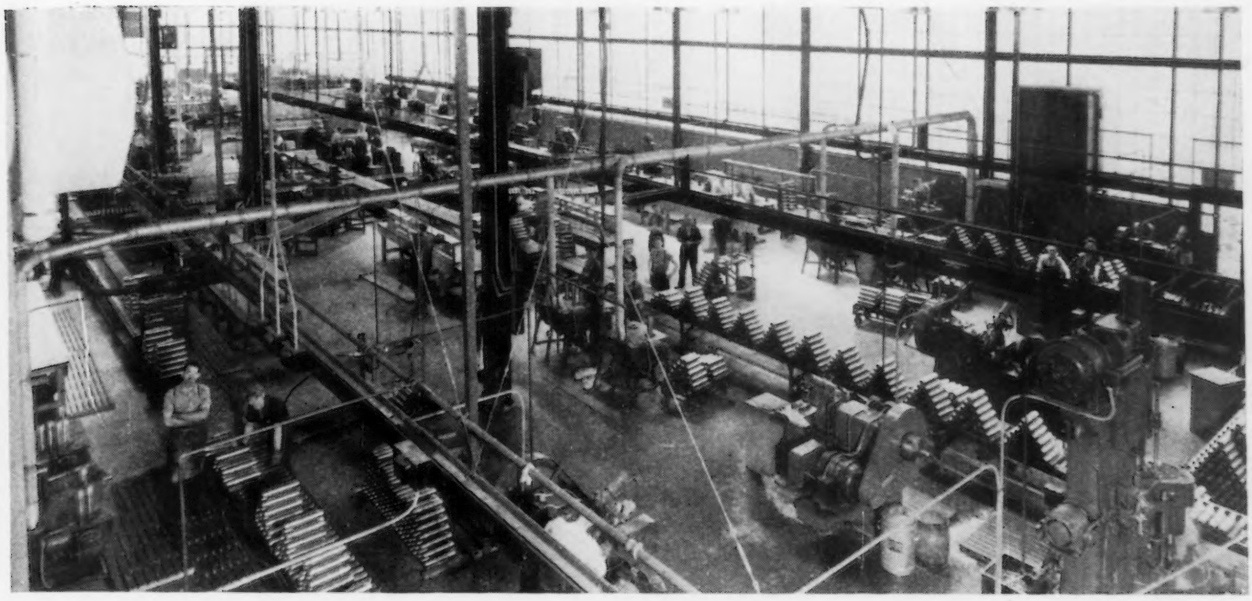
"The government had ample power under the War Measures Act to take whatever steps might have been necessary to protect the steel plants in which the CIO-SWOC were threatening to call strikes. Instead of taking the direct and only effective way of meeting that challenge to its authority, the government chose to evade joining the issue by demanding that we, who had been serving it well and had deserved its protection, be sacrificed merely to

Coming Events

Sept. 23 to 26—Iron and Steel Engineers, annual convention and exposition, Cleveland.

Oct. 1 to 4—The Electrochemical Society, Fall Meeting, Chicago.

Oct. 20 to 24—National Metal Congress, Philadelphia.



SHELLS FOR BRITAIN: From this new shell shop of National Steel Car Corp. at Hamilton, Ont., comes thousands of shells weekly for the United Kingdom and Canada. The plant began making shells in 1936.

save the government temporary embarrassment.

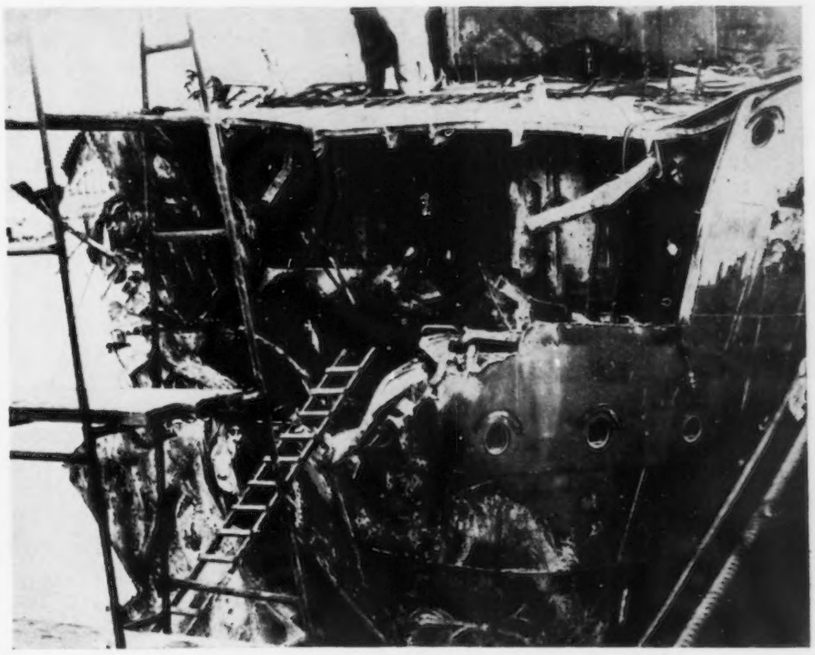
"What the CIO-SWOC has done to contribute to Canada's war effort we do not know. Your company has made the following efforts: Three years before the Canadian government came into the market for shells, and then only as purchasing agent for the British government, we had begun manufacturing shells under direct contract from the British government. In the course of time we developed a technique for producing shells in volumes that enabled us to sell them to the British government on a decreasing scale of unit prices and to deliver them ahead of promised delivery dates. The results were achieved by methods that meanwhile enabled us to increase the average hourly earnings of our employees by over 47 per cent."

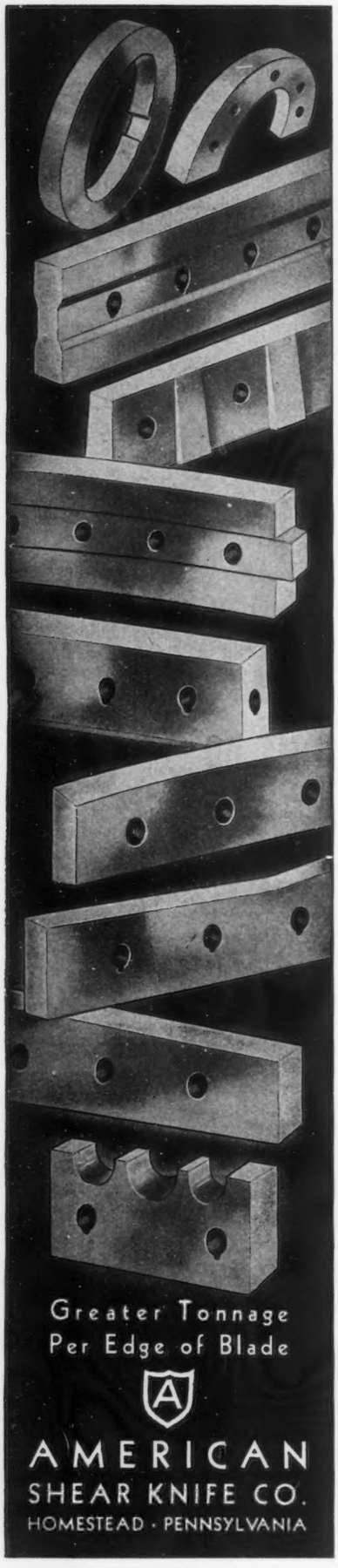
Since the company's position was explained to the shareholders and to the public, Controller Brunning, in all of his capacities, has been warned against "fostering" a company union. "I wish to warn the Board of Conciliation (set up to arbitrate the strike) that any attempt on the part of the controller to establish a representative committee of the employees, in some kind of government election, which would be nothing but a company union, will be met with the full resistance of the employees and their organization," said C. H. Millard, executive secretary of the SWOC organizing committee at Hamilton. Mr. Brunning said he would not foster a company union.

How far the union will go in seeking to enforce its demands against the Canadian government-management of the National Steel Car plant is not clear. It seems to be a problem for Controller Brunning in his capacity as manager of labor relations at the plant.

NOT A VITAL WOUND: The Canadian destroyer, pictured after being struck in the North Atlantic by a torpedo, has been repaired and sent back into service.

Photo by International





U. S. Scrap Control Fails to Meet Needs

By T. C. CAMPBELL
Pittsburgh Editor

• • • **Almost 12 weeks** of governmental control of iron and steel scrap markets has thus far failed to produce an orderly and sufficient flow of scrap to the steel industry and more especially to plants in this area.

Whether or not the scrap orders promulgated by OPACS have retarded the flow of scrap is debatable, but it appears that they have not helped the situation.

Although some dealers, consumers, and OPACS officials refuse to believe that there is a growing shortage of scrap in relation to current steel mill consumption requirements, such a failure to face the facts has had no effect on the growing scarcity of old metal. Nor has the failure to appreciate overall present conditions altered a swift trend which is reaching the point where some steel plants may be forced to curtail operations because of lack of scrap in the near future.

Whether or not there is a shortage of scrap, however, is probably not as important as whether a flow of available scrap can be kept going at a rate to satisfy current demands and thus prevent hindering the national defense effort through lack of steel. That such a satisfactory flow of material is not apparent here is indicated by the fact that one large plant in the Pittsburgh area has only a few days' floating supply of scrap. A sudden hitch in obtaining freight cars to deliver scrap en route to this plant could seriously and irrevocably cut down production of steel ingots.

Even though the motives of consumers, scrap brokers or OPACS officials are the highest, this does no good if the open-hearth superintendent does not have an orderly flow of material to his furnaces. He must also have a better setup than one which dictates that he should take scrap practically off railroad cars direct to the open hearth.

Scrap people in some instances, and OPACS officials as well, insist there is enough scrap to go around, but such a belief becomes an impractical theory when consumers are forced, due to dire necessity, to violate not only the spirit of the regulations, but the actual regulations as well. A steel maker who needs scrap to keep his mills going is sooner or later going to reach a point where he will order, say, No. 1 steel, and take anything that can be melted. Or he might order low phosphorous steel for his electric furnace and be glad to take what he can get. There are signs that some mills have already been forced into this position.

Attempting to place the blame for the present scrap situation on any group would produce little or no good. Nor do charges of hoarding hold water when the amount of alleged hoarding is but a drop in the bucket compared with the total amount of market scrap moved. Charges of special privileges, likewise, do not produce scrap for those who now need it or will need it soon in larger quantities than they are now receiving it.

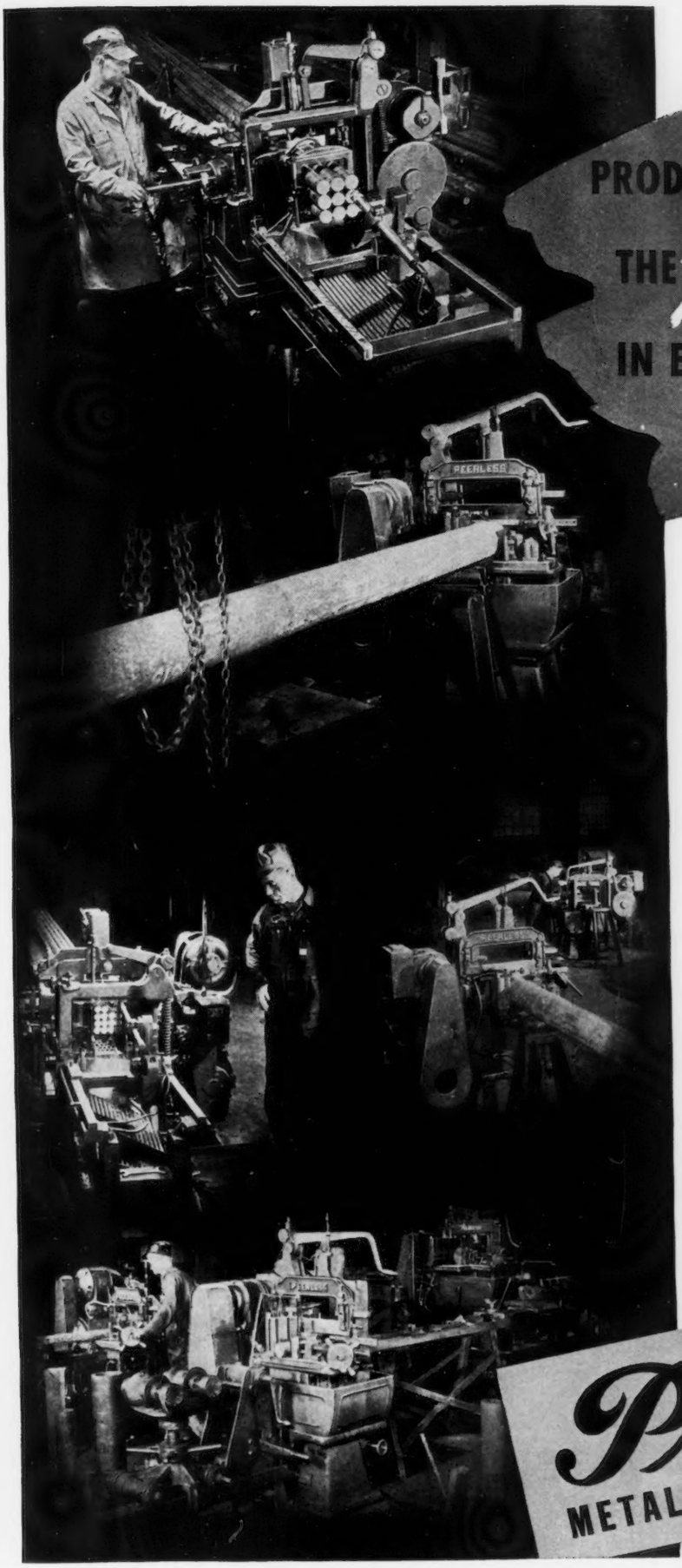
Observers here believe that the whole scrap situation will come to a head when a steel mill is actually forced down, unless allocation

Switching Costs on Scrap are Revised

Washington

• • • A revision in regulations governing use of the 84c. switching charge in the Chicago area when computing iron and steel scrap prices was announced June 25 by the Office of Price Administration and Civilian Supply. Previously it has been required that this charge be deducted from the maximum price of scrap when sold to consumers outside of Chicago by railroads operating in Chicago.

The latest revision eliminates this deduction and, instead, permits Chicago consumers of scrap originating from railroads operating in Chicago to pay as much as 84c. per ton in switching charges above the maximum prices from this source. The change became effective June 21. This revision should be noted in the footnote to tables in Schedule B of the maximum prices published in THE IRON AGE, June 26, page 117.



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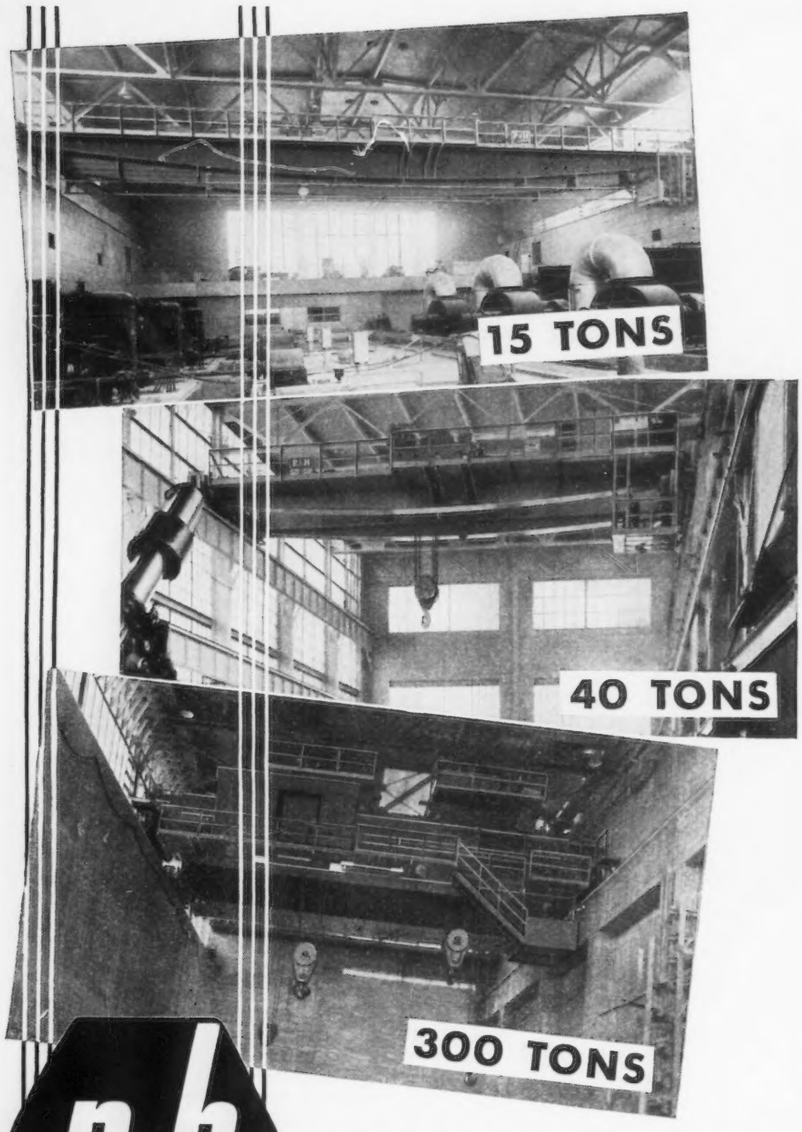

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of supplies temporarily postpones the crisis. It is said that efficiency at some mills has been affected already due to inability to obtain scrap when, and in quantities, needed.

This district is one area which has been discriminated against—whether intentionally or not makes little difference. Mills here cannot go to districts where they formerly obtained scrap during periods of great activity. There are certain South and Southwest regions that cannot be tapped becaused of ceiling prices, and the $11.20 freight allowance for remote scrap still leaves some questions unanswered.

Considerable difficulty is being met in obtaining scrap from the East, where the f.o.b. price is the same for sections closer by. Brokers and dealers, it is said, are naturally going to ship scrap to points where there is the least trouble involved, and if Pittsburgh interests offer the same f.o.b. price, that in itself is no criterion that they will obtain material.

That things are not in an enviable state can be found in the increasing number of rumors that grades definitely not No. 1 steel are being supplied on No. 1 orders. Even though such cases are classed as rumors, it goes without

WORKING WITH WIRE: Members of the Canadian Officers Training Corps. of McGill University are shown laying

saying that people forced into such positions are not going to advertise it.

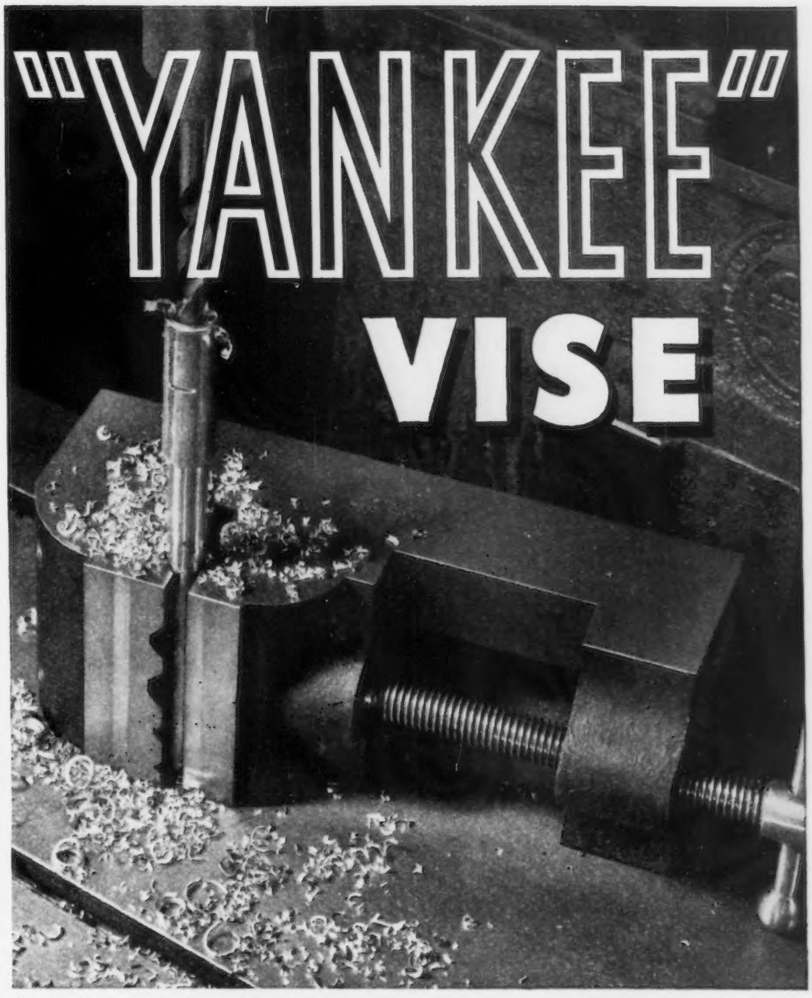
Furthermore, it is claimed by consumers and dealers alike that if current conditions continue here there is little doubt that specifications will become even more "liberalized" and such a result can be attributed to lack of scrap and not to any chiseling intent. Steel makers will undoubtedly become more frantic if the scrap situation continues to get worse, since they already face a pig iron "situation."

On the question of constructive criticism, some scrap observers believe that as long as civilian steel consumers are being forced to make sacrifices because of national defense, exports of scrap from this country, no matter to whom, should be curtailed or eliminated until the situation at home takes on a better view.

It is also believed that among various brokers and dealers, as well as scrap consumers, that there are clear thinking individuals who so far, because of various reasons, have been inarticulate. Whatever the answer, all is not well within the scrap industry and if the turmoil, argument, prejudices, and actions boiling underneath the surface are any criterion, a crisis may be reached soon.

shown receiving instruction in the laying of barbed wire entanglements.

Photo by British Combine



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Unretouched photo of machine-cutting. Note the inseparable bond formed between the mild steel and the cladding of stainless steel.

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"A Borg-Warner Product"

May Structural Steel Shipments Exceed Orders by 7500 Tons

New York

• • • **New orders** for fabricated structural steel booked during May were the smallest in volume for any month so far this year, according to American Institute of Steel Construction reports, totaling 165,186 tons, as compared to 212,320 tons in April.

Shipments during May were 172,730 tons, slightly more than 7500 tons in excess of the bookings, reducing the backlog of orders scheduled to be shipped within the next four months to 718,897 tons.

Delco Workers Get Pay Raise

Kokomo, Ind.

• • • **Increase of** 8c. an hour has been given Delco radio division of General Motors employees. Raises of 2 to 5c. an hour had been established last March so that 1250 workers are getting 10c. or more an hour increases. Three unions, all affiliated with AFL, shared in the negotiations.

2200 F.: Pvt. Herbert Davis of the 31st. engineers, Fort Belvoir, Va., is shown demonstrating a new model flame thrower which

$8.5 Million Expansion at Elwood Ordnance Plant

Joliet, Ill.

• • • **Elwood Ordnance Plant** near here will be expanded with an additional investment of $8,575,000 by the War Department. This brings the total for the ammunition loading plant to $18,057,000. Additional money will provide buildings for bomb, detonator and primer loading. More land will not be needed since the tract comprises 14,735 acres. Sanderson and Porter are engineering contractors.

$10 Million Gun Turret Plant for St. Louis

St. Louis

• • • **A $10,000,000 aircraft** gun turret plant is contemplated here with Emerson Electric Mfg. Co. receiving a "letter of intent" from the War Department. Proposed factory will contain about 700,000 sq. ft. and will be built near the company's new plant, adjacent to the Wabash Railway tracks.

weighs 75 lb. and has a temperature of 2200 F. Asbestos clothing is not required with this model thrower. One man controls the flame.

Photo by Wide World

Modern AS THEY MAKE THEM ... THIS NEW PLANT

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Electroplaters Debate Year's Developments

(CONCLUDED FROM PAGE 44)

polarization. Current densities below 5 to 10 amp. per sq. ft. result in anode slimes and rough deposits. Carbonates are removed with barium hydrate or lime. Freezing is not recommended. The tank should be rubber lined and under automatic temperature control.

"Unichrome Copper" was presented by T. G. Coyle, United Chromium, Inc., New York. For electroplating copper at the present time, two types of solutions are available; the acid and the alkaline. The author described a new alkaline copper solution called Unichrome.

(1) Deposits may be obtained in thicknesses 0.001-0.002 in., which are smooth, have good luster, make a good base for bright nickel, may be buffed at low cost, oxidize and etch well, and have an active surface, free from films. The solution is of the pyrophosphate type, made up approximately as follows:

Copper	3-5 oz.
Pyrophosphate	20-40 oz
Ammonia	⅛ to ¼ oz.
Buffer salt	pH of 8.0-8.5

It is concentrated, having a Baumé of about 66 deg. Its cost is about 80c. per gal. The copper is cupric; the solution is non-toxic and non-gassing. The higher current density and longer time to plate cupric over cuprous copper is made up for by the very high anode and cathode efficiencies, both about 100 per cent.

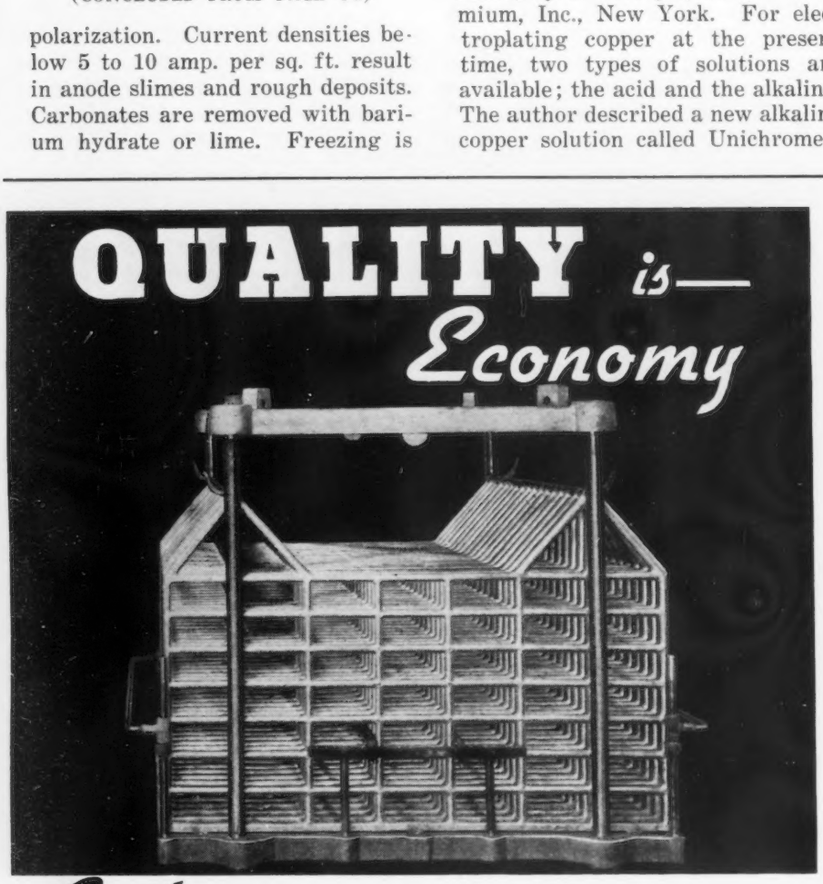
There is no decomposition of bath constituents. The metal content is maintained by anode corrosion except for drag-out. Since the solution is non-corrosive, it does not attack resistors and rack coatings. It is free rinsing, of low viscosity and low surface tension.

The solution is operated at 100 to 140 deg. F. with a current density of 20-40 amp. per sq. ft. Voltage 1½ to 2. The anodes should be electrolytic copper. Agitation is recommended.

Solution should be filtered. Use rubber, stainless steel, plain steel or cast iron (not lead) for contact with the solution.

Unichrome copper may be applied to any base metal. For steel or zinc, use a copper strike to insure good adherence. A copper cyanide strike may be used or the special Unichrome copper strike which calls for no rinsing before placing in the Unichrome copper solution.

QUALITY is— Economy



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Revised SAE Steels—Erratum

IN the tables covering chemical analyses of the revised series of SAE steels, published on pp. 50 and 51 of the June 5 issue of THE IRON AGE, an error appears in the series of carbon steels. The second 1020 steel listed in the series, which were taken from proofs of the 1941 *SAE Handbook*, should have been designated as X1020 inasmuch as this grade has a different manganese range than the regular SAE 1020 steel.

51 Chicago Plants Expand in June

• • • **Industrial expansion here** for first six months of the year was four times greater than 1940 and 20 times more than the same period in 1939. Authorized expenditures of $121,827,000 were made this year, while only $6,876,000 was invested in new plants or additions for the first half of 1939. In the 30 days of June, 1941, 51 Chicago plants started expansions, costing $11,568,000.

Primary army and navy contracts totaling $301,361,000 have been placed in this area since Jan. 1.

Among the firms getting certificates of necessity during June were Clearing Machine Corp. for production of mechanical and hydraulic power presses and press brakes; Taylor Forge & Pipe Works for steel fittings, flanges and corrugated fire boxes; Strom Steel Ball Co. for bearing balls; Bliss & Laughlin, Inc., for cold finished steel; Metals Refining division of the Glidden Co., for the manufacture of oxides.

HARBOR MINE: One of many war and defense mechanism being shown in the "Defense in Action" exhibit at the New York Museum of Science and Industry, Rockefeller Center, is being inspected by Maurice Holland, of the National Research Council and Chauncey I. Williams, vice president, F. W. Dodge Corp.

Railroad Investigates Scrap Held in Small Towns

• • • **What may be an** important source of scrap iron and steel heretofore overlooked in defense efforts may be developed as the result of an investigation to be conducted by the Northwestern Railroad over its 10,000 miles of territory. The road has requested local agents of its line in towns of 1,000 population or less to obtain the names of scrap dealers in their communities, the approximate amount of scrap shipped annually and the amount now assembled and available for shipment. In a survey it was found that small communities had dumps full of old automobiles, farm implements and discarded machinery and no effort has been made to make this material available for the market.

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Philadelphia Area Steel Casting Output at Peak

• • • **Steel casting** production in May in the Philadelphia Federal Reserve District was 14.4 per cent over that of April, surpassing slightly the previous high record set in March, while gray iron casting production declined 3.7 per cent. Production of 7287 tons of steel castings and 7693 tons of gray iron castings was reported.

$1,628,999 Contract for Boeing

Seattle

• • • **Boeing Aircraft Co.** last week received an Army contract for $1,628,999 for aircraft maintenance parts.

92.5% of Kropp Forge Output for Defense

Chicago

• • • **Exactly 92.5 per cent of output of Kropp Forge Co. here is going to national defense. Reputed to own the largest job forging plant, the company has defense orders covering parts for guns, tanks, airplanes and other armament equipment.**

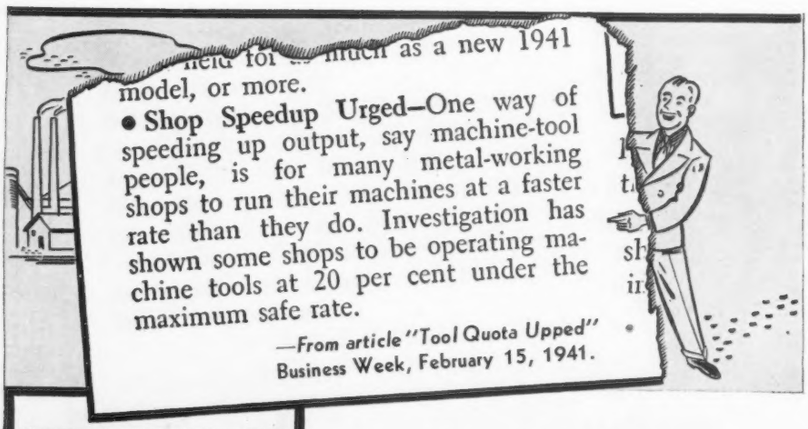
British Offer To Supply Zenith Radio Corp. With Alnico Steel

Chicago

• • • **British steel manufacturers** have offered to supply Zenith Radio Corp. with "alnico" steel, used in radio production, according to E. F. McDonald, Jr., president of the radio company.

Addressing the annual stockholders' meeting, Mr. McDonald stated that British steel producers have a surplus of this aluminum-nickel alloy steel, of which there is a shortage in this country. About five oz. of "alnico" are used in making each radio set, he said, as compared with seven oz. used in the past.

With unfilled orders the largest on record for this time of the year, Mr. McDonald said that an additional 112,000 sq. ft. of floor space has been acquired.

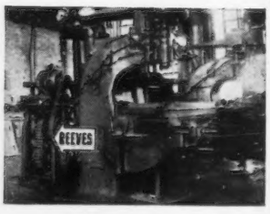


held for as much as a new 1941 model, or more.

• **Shop Speedup Urged**—One way of speeding up output, say machine-tool people, is for many metal-working shops to run their machines at a faster rate than they do. Investigation has shown some shops to be operating machine tools at 20 per cent under the maximum safe rate.

—From article "Tool Quota Upped" Business Week, February 15, 1941.

EXAMPLE 1 • As cutter sizes are changed on this vertical milling machine, used for flat work milling, so are spindle speeds varied, thanks to the REEVES Transmission in connection with the change gear in the pulley at top of machine.



EXAMPLE 2 • In a Detroit machine tool shop, production on this lathe was increased by a full 25 per cent after application of a REEVES Vari-Speed Motodrive. Output speeds on the Motodrive range from 110 to 442 rpm.

FASTER or SLOWER

-it's Easy with REEVES Variable Speed Control

There *is* a vital need for faster production, particularly in defense industries, *but faster machine speed is not always the answer.* It is *correct* speed, whether it be faster or slower, that turns out maximum quantity without rejects or spoilage. A REEVES Variable Speed drive permits operation at any speed that is best for the particular job. It enables operators to change speeds, almost instantaneously, as the work demands. It is accurate, positive and dependable. Many sizes of three basic units insure correct installations. Write for full information on how you can use REEVES Variable Speed Control units to speed up production and improve processing in your plant.

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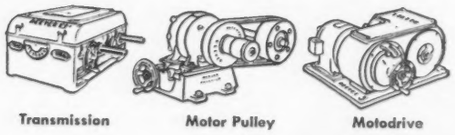
THE 3 BASIC UNITS IN THE REEVES LINE



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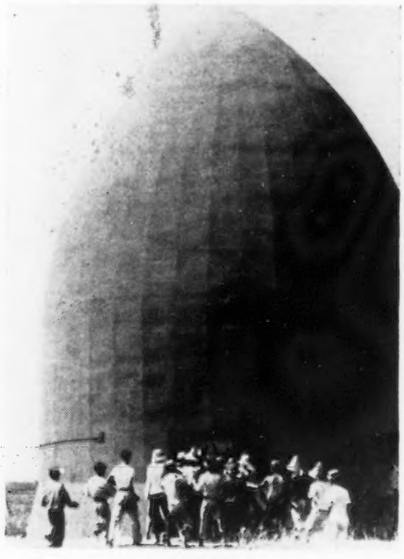
DUTCH SHELTER: Here is a new type bomb shelter erected in Batavia, Dutch East Indies.

Photo by Wide World



WESTINGHOUSE EXPANSION: C. L. Van Derau, manager of the merchandising division, Westinghouse Electric & Mfg. Co., Mansfield, Ohio, has announced a half million dollar enlargement of the Mansfield plant.

22.1 Million Tons of Scrap Used in First Five Months

• • • **Domestic consumption** of iron and steel scrap by steel mills and foundries in the first five months of 1941 is estimated by the Institute of Scrap Iron and Steel at 22,127,000 gross tons, compared with 14,730,000 tons in the corresponding period of 1940.

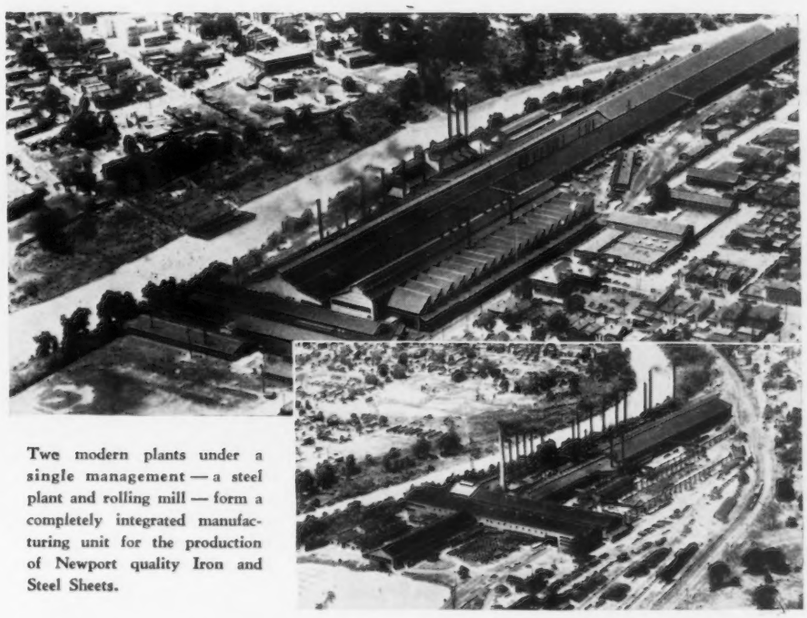
Consumption in May, at 4,609,000 gross tons, represented a substantial increase over April when the melt was 4,406,000 tons. The March total of 4,662,000 tons is the only month in history to exceed the May rate, but if it had not been for the Memorial Day holiday, May would have set an all-time record.

Exports to Great Britain and Canada have increased slightly, but the average monthly rate of export thus far in 1941 has been only 72,411 tons, compared with a domesitc use of 4,425,000 ton monthly average.

AFL, CIO Each Win 2 Harvester Elections

Chicago

• • • **AFL and CIO equally** divided victories in four of International Harvester plants out of six elections conducted by the NLRB. CIO won victories at the West Pullman plant in Chicago and at the East Moline, Ill., plant. AFL emerged the winner at the Farmall plant in Chicago and at the Milwaukee works. Two elections will have to be repeated because of disputed votes and failure by either side to obtain a majority. Biggest run-off election will be at the McCormick works in Chicago, where the big strike started several months ago, and at the Rock Falls, Ill., plant.



Twe modern plants under a single management — a steel plant and rolling mill — form a completely integrated manufacturing unit for the production of Newport quality Iron and Steel Sheets.

Your search for Quality Iron and Steel Sheets ends here at NEWPORT

Hot Rolled Sheets • Newport Electrical Sheets • GOHI Pure Iron-Copper Alloy Sheets • Globe Brand Galvanized Steel Sheets, Roofing and Siding • GOHI Enameling Iron Sheets • KCB Copper Steel Sheets • Newport Long Terne Sheets • Newport Galvannealed Sheets • Newport De-Luxe Metal Sheets.

It is no small accomplishment to produce iron and steel sheets of fine quality in these days of strict metallurgical control and modern manufacturing processes. However, to maintain uniformly highest quality during almost half a century of service to critical buyers, is the achievement of Newport, where since 1891 there has been but one standard of excellence; with every sheet the best for the particular purpose for which it is intended.

Iron and Steel Sheets by Newport are available for all general industrial and commercial uses, in sizes, gauges, grades and finishes to your exact specifications. Entrust your requirements to Newport, and enjoy the many advantages that come to users of these superior sheets.

THE NEWPORT ROLLING MILL CO.
NEWPORT KENTUCKY
DIVISION OF THE ANDREWS STEEL CO.

ANDREWS PRODUCTS IN CARBON AND ALLOY STEEL: BARS • PLATES • UNIVERSAL MILL PLATES • SHEET BARS • BILLETS • BLOOMS • SLABS.

HERE LIES A GOOD TOOL THAT WAS SADLY ABUSED

SAVE YOUR TOOLS
from an early death

Save the tools from abuse and you save on production costs. After you have done a good job in tooling your machine tools, finish the good work with a good coolant pump. It will save your tools from an early grave.

Many builders and users of machine tools prefer the Gusher Coolant Pump with its variable delivery from a trickle to a flood. They like the packless, non-priming, non-clogging features of the Gusher Pump.

The RUTHMAN Machinery Company
CINCINNATI, OHIO, U.S.A.

LEE
Quality Springs
ALL SHAPES · ALL SIZES · ALL MATERIALS

LEE SPRING COMPANY, Inc.
30 MAIN STREET BROOKLYN, N.Y.

LEE-BUILT TRADE MARK SPRINGS

$10 Billion Army Bill Largest in History

Washington

• • • **A $10,384,821,624 Army** appropriation bill, containing a $448,312,132 item added by the Senate without budget approval, $2,790,890,000 for the purchase of military aircraft and accessories, and $3,357,372,132 for prior fiscal year obligations, was passed by the Senate in short order last week and sent to conference.

It is the largest single appropriation bill in the history of Congress, and exceeds by $1,205,471,086 an earlier estimate of 1942 requirements.

Earmarked for the purchase of aircraft is $2,506,868,000. A committee report estimated such a sum would buy 12,856 planes, of which "many" would be of the long-range type. A further breakdown was not given. Also provided for was a $51,000,000 item for expenditures required by the acquisition of Atlantic offshore bases procured from the British. Final cost of these bases has been placed at $200,000,000.

Taxes a Problem for Government Powder Plant

Charlestown, Ind.

• • • **The government powder** plant here faces tax problems. State tax board will meet with representatives of the federal government and of E. I. DuPont de Nemours & Co., who operate the plant, to determine whether the property is taxable. The Clark county tax board here refused to pass on a tax exemption petition and the state tax board will settle the question.

Efforts Made to Reopen Idle Plants At Gary

Gary, Ind.

• • • **Prediction that reopening** of National Tube Co. plants here will be reopened soon was made by officers of the local Chamber of Commerce. Spokesmen of the United States Steel Corp., of which the Tume company is a subsidiary, declined to comment on any proposed action.

Standards Bureau to Push Simplification as Defense Output Aid

Washington

• • • **The Bureau of Standards,** which has acted as impartial coordinator in the promulgation of 180 simplified practice recommendations since World War I, has pledged close collaboration with the OPM program to eliminate unnecessary sizes and varieties of manufactured products. Director of Purchases Donald M. Nelson, in announcing the OPM decision to undertake such a simplification program, has estimated that the country's productive capacity for defense could be increased from 25 to 33 per cent by eliminating unnecessary variety in sizes, types, grades and qualities of civilian goods.

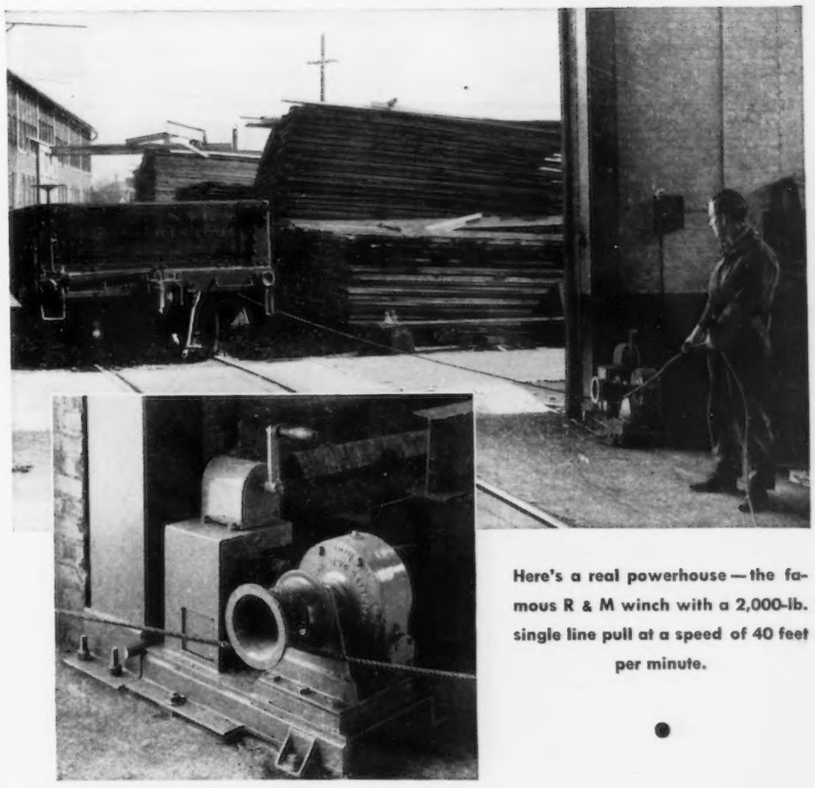
A statement from the Bureau of Standards, while giving no details of the simplification program, said that a plan of collaboration has been approved by all interested federal agencies and that the Justice Department's anti-trust division had given it the green light, thereby removing any stigma of collusion.

The Bureau of Standards has acted as impartial coordinator in the promulgation of 180 simplified practice recommendations adopted since World War I. The simplification and standardization got its start through the old War Industries Board, and a division of simplified practice was established in the bureau in 1921. Its purpose was to function as a centralizing agency for bringing together producers, distributors and users, and to help in establishing such recommendations they developed.

Payday Brings 97c. to Biggers

• • • **Because John D. Biggers,** president of Libbey-Owens-Ford Glass Co. and director of production in the Office of Production Management, had 11 days to go to round out a year's work when payday came recently, he received a check for 97c. on his dollar-a-year contract with the government. Mr. Biggers plans to hold his check as a memento of his emergency services.

Plenty of Pull WITH R & M



Here's a real powerhouse — the famous R & M winch with a 2,000-lb. single line pull at a speed of 40 feet per minute.

Empty cars in the shop . . . loaded cars ready for the night crew. It's easy with an R & M winch on the job pulling for you day and night.

The R & M really keeps things moving . . . in the shop and on the outside. It's rugged and powerful . . . built by the famous makers of R & M hoists and cranes for industries everywhere.

From the air or on the ground, R & M has an *economical* answer for your material-handling problem. It will pay you to call an R & M field expert for time- and money-saving ideas in *your* plant. Get in touch with your nearest R & M sales and service office today.

R & M SALES AND SERVICE OFFICES

Albany . . . . . 364 Broadway	Cleveland . . 352 Rockefeller Bldg.	Newark . . . . . 700 Bergen St.
Atlanta . . . . . 909 Myrtle St.	Denver . . . . . 1424 16th St.	Philadelphia . . . 401 N. Broad St.
Boston . . . . . 55 Long Wharf	Detroit . . . . . 2921 E. Grand Blvd.	Pittsburgh . . . . . 705 Oliver Bldg.
Buffalo . . . . . 2005 Delaware Ave.	Houston . . 4715 Harrisburg Blvd.	San Francisco . . . 237 Rialto Blvd.
Chicago . . . . 2400 W. Madison St.	Jacksonville . . . . 305 Bisbee Bldg.	Seattle . . . . . 216-17 Walker Bldg.
Cincinnati . . . . . 418 New St.	New York . . . . . 200 Varick St.	Syracuse . . . . . 304 Tower Bldg.

Montreal . . . . Lyman Tube & Supply Co., Ltd.

ROBBINS & MYERS, Inc.

HOIST & CRANE DIVISION • SPRINGFIELD, OHIO

MOTORS • FANS • MOYNO PUMPS • FOUNDED 1878

STEEL SHELTERS: This is the Broden Construction Co., Cleveland plant, now controlled by Wean Engineering Co., Warren, Ohio, which may be enlarged to fabricate steel air raid shelters.

LIGHTER GAUGE STAMPINGS, too

The versatility of our men and machines is limited only by the needs of those who entrust to us the important task of producing their stampings.

In the instance illustrated, a Tank Rim for an electrical transformer—16¾" long, 18⅛" wide and 5¼" deep—was stamped out of steel .075" thick. Yet each angle, arc, port and flange is clean and clear—and true to gauge.

Present your problems to Parish. The services of our engineers frequently result in economies of important proportions . . . yet their contributions are not evident in our costs.

Let us review your requirements.

PARISH PRESSED STEEL CO.
READING, PA.
PACIFIC COAST REPRESENTATIVE, F. Somers Peterson Co., 57 California St., San Francisco, Cal.

Wean Engineering Buys Control of Broden Co.

Warren, Ohio

• • • **Negotiations have been** concluded for the purchase, by the Wean Engineering Co., Inc., of a controlling interest in the Broden Construction Co., Cleveland, designers and manufacturers of wire and strip mill machinery.

This company will be operated as a subsidiary corporation of Wean Engineering, which specializes in the design and manufacture of processing and annealing equipment for sheet, tin and strip mills.

Other associate companies of the Wean Engineering Co., Inc., are the McKay Machine Co., Youngstown; Flinn & Dreffein Co., Chicago; Lee Wilson Engineering Co., Cleveland; the Hallden Machine Co., Thomaston, Conn.; Wellman-Smith Owen Engineering Corp., Ltd., London, England; and the Wean Engineering Co. of Canada, Ltd., Hamilton, Canada.

The new officers of the Broden Construction Co. are: R. J. Wean, president and treasurer; F. J. Keller, vice-president and general manager; S. R. Wean, secretary, and N. L. Fromberg, assistant secretary. Directors include the foregoing and E. J. Boyd, Warren, and H. W. Lynn, manager of sales for Wean Engineering Co., Inc.

DeVilbiss Doubles Spray Unit

Toledo

• • • **The DeVilbiss Co.** has doubled the size of its spray booth and exhaust equipment division, representing an investment of $40,000.

Car Registrations 488,000 Units in May

Detroit

• • • On the basis of reports from 19 States representing 24.14 per cent of the country, new passenger car registrations for May are estimated at 488,000 units, only slightly under the record-breaking total established in April, R. L. Polk & Co., announced.

Canton Naval Ordnance Plant Starts Operations

Canton, Ohio

• • • With small scale operations under way already several weeks ahead of schedule, production at the naval ordnance plant here will be increased gradually until 2000 skilled machine operators are busy.

In the first of four buildings to be completed a few machines were started June 19 making gun parts, just 143 days after ground was broken on the site of the $16,000,000 plant.

At a recent banquet for naval officers and executives of the Westinghouse Electric & Mfg. Co., Gov. John W. Bricker of Ohio welcomed the men who will run the plant, and told them "you not only favored Canton and Ohio with your selection but you have also strengthened national defense by coming to the central part of our country."

The plant will be operated by Westinghouse, and will manufacture gun mounts and slides, breech housings and breech blocks, recoil mechanisms and other ordnance materiel.

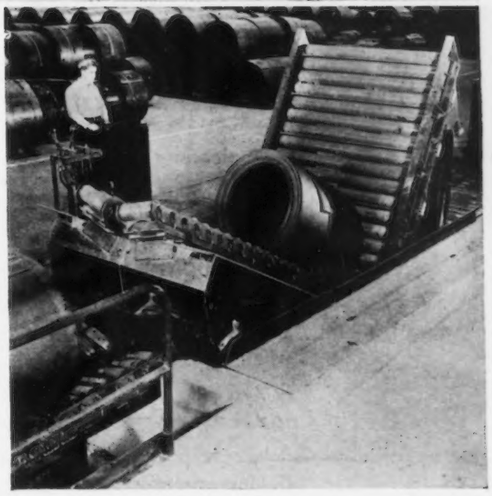
Auto Companies Teach Army Men To Drive

Detroit

• • • Among tasks which automobile companies have been called upon to perform in the defense program are those of educating Army men. Most of the plants engaged in producing vehicles for the defense program have special courses to train automobile mechanics for the Army. However, a new slant on this educational work is offered by Dodge, which is giving practical training in driving Army trucks in rough going on a specially constructed testing ground adjoining the Dodge truck plant.

Each week 30 commissioned officers from cantonments throughout the country attend the school. Wednesday afternoons the course is devoted to a driving field day for the Army men. Each officer takes turns in driving reconnaissance cars, command cars, weapon carriers, troop transports, cargo transports and ambulances over grades of 60 per cent and more, through a big pit filled with mud and water, over rutted fields, bogs and through second-growth brush. Other days of the week the officers attend lectures and take part in practical shop work in maintenance and service from 8 o'clock in the morning until five in the afternoon.

Mathews CAN HELP YOU Speed PRODUCTION



• Today — the call to arm demands speed . . . and more speed. Mathews has had over a quarter of a century of experience working with the steel industry. That experience is available to you today.

One of 30 Mathews experienced Field Engineers is near you with ready and able service.

INCREASED CAPACITY FOR NATIONAL DEFENSE

Our plant capacity has been increased over 65% to care for the rising demands of the National Defense Program — plus the normal demands of peacetime production.

All orders, whether subject to Defense priorities or not, are given the same helpful care and attention that have always marked our dealings with prospects and customers in the past.

MATHEWS CONVEYER COMPANY

114 TENTH ST. - - - - - ELLWOOD CITY, PA.

Field Engineers and Sales Offices located in 30 Industrial Centers.

Government Awards . . .

War Dept., Ordnance:

Ace Drill Co., Detroit; drills, twist $2,326
Acme Industrial Co., Chicago; gages 10,354
Acme Pattern & Machine Co., Inc., Buffalo; gages 1,225
Alan Wood Steel Co., Conshohocken, Pa.; plates, floor diamond figured 4,693
steel 2,703
Albert & Davidson Pipe Corp., Brooklyn; pipe, steel 1,107
Alloy Fabricators, Inc., Perth Amboy, N. J.; kettles, jacketed dissolving 2,736
Aluminum Seal Co., New Kensington, Pa.; machines, assembling. 10,000
American Car & Foundry Co., Berwick, Pa.; plates, clutch 13,105
supports, engine assy. 4,212
American Chain & Cable Co., Andrew C. Campbell Division, Bridgeport, Conn.; machines, abrasive cutting 2,637
American Cutter & Engineering Co., Detroit; cartridge punches and ejecting stems 72,350
American Locomotive Co., New York; casting machine equipment 13,993
American Locomotive Co., Railway Steel-Spring Division, Latrobe, Pa.; springs 7,210
American Manganese Bronze Co., Philadelphia; bronze, manganese, bars 3,645
American Smelting & Refining Co., Federated Metals Division, Newark; bismuth solder 1,965
Apex Tool & Cutter Co., Inc., Shelton, Conn.; cutters and mills 3,925
cutters, inserted blade 2,108
cutters 8,897
mills, shell end 2,638
Arens Controls, Inc., Chicago; assys., hand throttle cable 1,691
G. R. Armstrong Mfrs. Supplies, Inc., Boston; screws 2,251
Atlantic Screw Works, Inc., Hartford; screws, wood 3,014
Auto-Ordnance Corp., Bridgeport, Conn.; guns 416,655
B.G. Corp., New York; parts for light tanks 16,193
elbows, tanks 6,015
Baldwin Locomotive Works, Standard Steel Works Division, Philadelphia; castings 205,104
Barwood & Co., Philadelphia; gages 7,896
Bay State Abrasive Products Co., Camden, N. J.; tools, grinding. 1,667
Belknap Hardware & Mfg. Co., Inc., Louisville, Ky.; hammers, machinist 1,081
Belmont Smelting & Refining Works, Inc., Brooklyn; copper ingots 1,543
Bendix Aviation Corp., Eclipse Aviation Division, Bendix, N. J.; parts for light tanks 2,134
cranks, starting 1,088
Bendix Aviation Corp., Scintilla Magneto Division, Sidney, N. Y.; spare parts 30,684
Berkeley Equipment Co., Corry, Pa.; motor drives for presses, heading machines and pocketing machines 3,944
Berry Bearing Co., Chicago; sights, gun mounts 4,143
Charles H. Besley & Co., Beloit, Wis.; machines, grinding 1,180
Bethlehem Steel Co., Bethlehem, Pa.; steel parts and overhaul of light tanks 1,160
G. S. Blakeslee & Co., Cicero, Ill.; machines, washing 5,580
Bliss & Laughlin, Inc., Harvey, Ill.; steel parts and overhaul of light tanks 5,078
Borg-Warner Corp., Ingersoll Steel & Disc Division, Chicago; seats, commercial, pressed steel 1,054
parts for tanks 19,978
Boyt Harness Co., Des Moines, Iowa; rolls, tool 4,206
Breeze Corps., Inc., Newark; parts for tanks 397,018
Bridesburg Engineering Co., Philadelphia; wrenches 2,393
Brockway Motor Co., Inc., Philadelphia; tractors 3,749
Brown & Sharpe Mfg. Co., Providence; parts for milling machine 1,759
machines, grinding 12,897
cams and tools for automatic screw machines 5,888
Burgess-Norton Mfg. Co., Geneva, Ill.; track parts 2,036
Carnegie-Illinois Steel Corp., Chicago; steel 27,588
Carpenter Steel Co., Philadelphia; steel 55,896
steel, tool 18,825
Carrier Corp., Syracuse, N. Y.; refrigeration cycle equipment 6,775
equipment, drying 36,946
Central Engineering & Supply Co., Chicago; screws, nuts and bolts. 3,216
Central Iron & Steel Co., Harrisburg, Pa.; plate, steel 4,463
Chandler & Price Co., Cleveland; cutters, power 5,214

WE'RE ONE . . .
. . of many thousand shoulders!

THE wheel is big — but not too big. It's rolling now, smooth and surely before the broad capable shoulders of American industry.

Our shoulder is there. So is yours; and that of the plant across the street; in the East and West, North and South. Working together we're irresistible—the job will be done.

We believe that here are three ways to help:

1. To help you avoid production slow-down we are working hard to supply *all* the springs you need — *when* you need them.

2. To help our suppliers we are ordering just enough to satisfy our needs for a reasonable period ahead.

3. To help us all we ask your cooperation in requisitioning quantities no greater than requirements demand for your own reasonable period ahead.

We're glad to work shoulder-to-shoulder with you.

SPRING HANDBOOK
Full of valuable data. Write for your free copy today!

Accurate Springs

ACCURATE SPRING MFG. CO. 3819 West Lake St. Chicago, Illinois
SPRINGS • WIREFORMS • STAMPINGS

Chase Brass & Copper Co., Inc., Cleveland; brass, equipment ... 2,369
brass tubing ... 1,119
brass ... 3,481

Chase, Parker & Co., Inc., Boston; cutters and mills ... 3,158

Cincinnati Planer Co., Cincinnati; planer, hydro double housing ... 30,675

Cincinnati Milling Machine Co., Cincinnati; machines, die sinking ... 51,280

Cleveland Cutter & Reamer Co., Cleveland; cutters, milling ... 1,506

Climax Molybdenum Co., Langeloth, Pa.; ferromolybdenum ... 102,978

Colonial Electric Co., Philadelphia; wire, stranded ... 1,313

Colt's Patent Fire Arms Mfg. Co., Hartford; small arms materiel ... 112,651
gun components ... 16,079
machine guns ... 909,931

Consolidated Packaging Machinery Co., Buffalo; loading equipment ... 24,805
equipment, weighing ... 2,725

Continental Motors Corp., Muskegon, Mich.; engine assys. ... 216,876
parts for tanks ... 156,091
motor assys., parts ... 29,682

Continental Roll & Steel Foundry Co., Corapolis, Pa.; castings, steel ... 5,490

Crucible Steel Co. of America, New York; steel ... 9,964
tool steel ... 8,579

Cutter Wood & Sanderson Co., Cambridge, Mass.; cutters and mills ... 3,147

Cyclone Fence Co., Newark; wire work partition ... 1,091

Delta Oil Products Co., Milwaukee; hydraulic oil ... 1,690

Detroit Harvester Co., Toledo, Ohio; links, metallic belt ... 4,614,400

Henry Disston & Sons, Inc., Philadelphia; plates, armor ... 6,018

Doehler Die Casting Co., Pottstown, Pa.; castings, die ... 2,129

Edgcomb Steel Co., Philadelphia; steel, strip ... 1,082

Electro Metallurgical Sales Corp., Niagara Falls, N. Y.; base metals 144,246

Firth-Sterling Steel Co., Philadelphia; steel ... 111,658

Ford Motor Co., Dearborn, Mich.; parts for service truck ... 14,106

Fox Munitions Corp., Philadelphia; gages ... 14,614

Freuhauf Trailer Co., Detroit; trailers ... 242,024

Gas-Weld Equipment Co., Inc., Boston; electrode holder equipment ... 2,289

General Electric Co., Philadelphia; motors, electric ... 1,546

General Motors Corp., Chevrolet Motors Division, Flint, Mich.; trailers ... 664,401

General Motors Sales Corp., New Departure Division, Meriden, Conn.; bearings, ball ... 3,585

General Steel Castings Co., Eddystone, Pa.; castings ... 174,156

Geometric Tool Co., New Haven, Conn.; chasers ... 4,135

Gleason Works, Rochester, N. Y.; tools ... 1,331

Good Roads Machinery Co. of N. Y., Inc., Albany, N. Y.; roller, road ... 2,270

Gould & Eberhardt, Newark; shaper 3,666

Grainger Rush Co., Boston; cable, and copper wire ... 2,070

Graton & Knight Co., Chicago; leather belting ... 1,647

Great Lakes Steel Co., Boston; sheet steel ... 26,267

Greenfield Tap & Die Corp., Greenfield, Mass.; taps, hand ... 1,806
gages ... 13,525

Hanson-Whitney Machine Co., Hartford; gages ... 10,223

C. I. Hayes, Inc., Providence; furnaces, preheating ... 1,985

Louis Hanssen's Sons, Davenport, Iowa; wrenches ... 6,346

Hesse Machine & Mfg. Co., Boston; gages ... 2,140

High Standard Mfg. Co., New Haven, Conn.; small arms materiel ... 9,239,399

Hires, Castner & Harris, Inc., Philadelphia; presses, primer foiling ... 7,300

Hobart Brothers, Troy, Ohio; welders, portable ... 3,090

Improved Paper Machinery Corp., Nashua, N. H.; washer, vacuum 8,551

International Business Machines Corp., Washington; equipment, time recording ... 6,561

International Harvester Co., Chicago; spare parts for medium tractors ... 16,905

B. Jahn Mfg. Co., New Britain, Conn.; gages ... 1,074

Johnson Claflin Corp., Marlboro, Mass.; gages ... 5,737

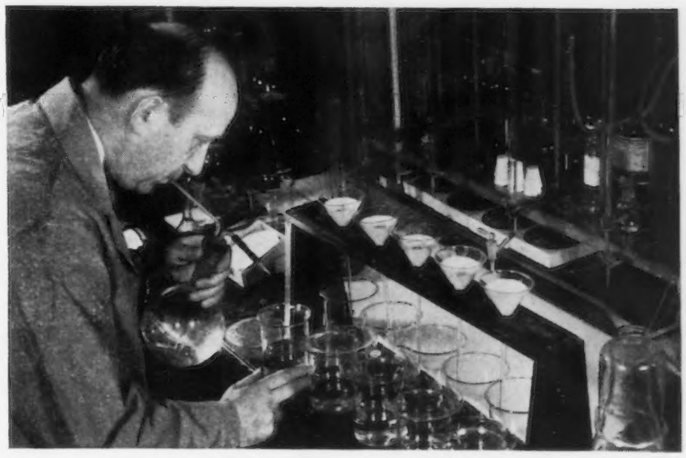
Jones & Laughlin Steel Corp., American Iron & Steel Works, Pittsburgh; steel bars ... 180,771
steel ... 8,435

Walter Kidde & Co., Inc., New York; fire extinguishers ... 2,963

Lapointe Machine Tool Co., Hudson, Mass.; blades, broach ... 11,930

LaSalle Steel Co., Hammond, Ind.; steel ... 2,608

STRONG · CONTROL



✓ **CHECK AND DOUBLE CHECK!**

Strong steel for Strong castings is Strong-made from the highest quality scrap and pig iron obtainable—and it is always under the vigilant acceptance or rejection of the chemical laboratory.

Every moment of the melting is under the control of competent experts, long versed in the making of casting steel. Each heat is subjected to rigid chemical and temperature checks during the refining process and a running record is kept of the chemical and physical properties of every melt. Know the Strong way for your castings—write or wire now.

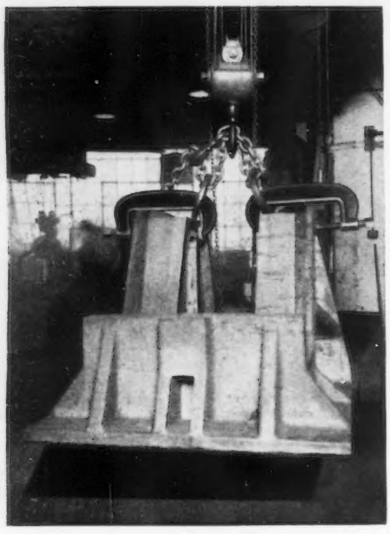
STRONG STEEL FOUNDRY COMPANY, BUFFALO, N. Y.

STRONG

TENSILE STRENGTH · ELONGATION

Latrobe Electric Steel Co., New York; steel, tool 1,120
Link-Belt Co., Ewart Plant Division, Indianapolis; castings, malleable iron 1,873
Ludlow Stamping & Fabricated Steel Co., Upper Darby, Pa.; handles, chest 6,459
Lyon Metal Products, Inc., Davenport, Iowa; sections, steel shelving 2,379
Machinery Builders, Long Island City, N. Y.; machines, complete, for assembling discs 1,758
Mackintosh-Hemphill Co., Pittsburgh; castings, steel 180,618
Manning, Maxwell & Moore, Inc., Bridgeport, Conn.; testers, pressure gage 9,326
Marlin Rockwell Corp., Jamestown, N. Y.; bearings, ball 1,292
Master Machinery & Tool Co., Chicago; gages 3,780
McKiernan-Terry Corp., Dover, N. J.; machines, staking 17,376
Merko Co., Los Angeles; gages .. 1,676
Midwest Tool & Mfg. Co., Detroit; cutters 1,100
Minnich Machine Works, Inc., Philadelphia; press, double chambel metal baling 1,395

ARMSTRONG



DROP FORGED "C" CLAMPS

ARMSTRONG Heavy Duty "C" Clamps are used day in and day out to lift and carry these giant automobile body dies where the least spring, or slip in clamp or screw would spell disaster.

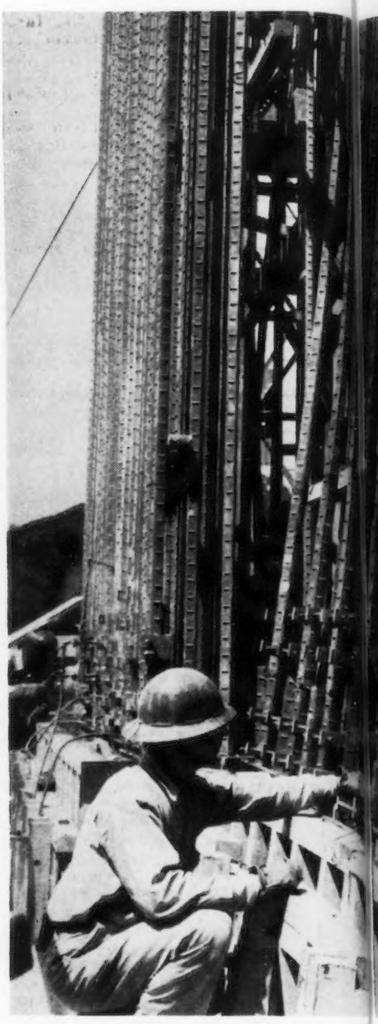
ARMSTRONG Heavy Duty "C" Clamps have strength and stiffness unknown in other clamps; have a uniform quality that can be safely depended on for not only ordinary, but extraordinary work. Heavy and correctly engineered designs with long hubs, extra large alloy steel screws and bodies drop forged from special steel, heat treated to give extra strength and stiffness.

You will find the same quality in ARMSTRONG Drop Forged "Medium Service", "Light Service", "Extra Deep Throat", and "Tool Makers" "C" Clamps —7 types each in all sizes. ***Write for Catalog C-39.***

ARMSTRONG BROS. TOOL CO.
"The Tool Holder People"
309 N. Francisco Ave., Chicago, U. S. A.
Eastern Warehouse & Sales: 199 LaFayette St., New York

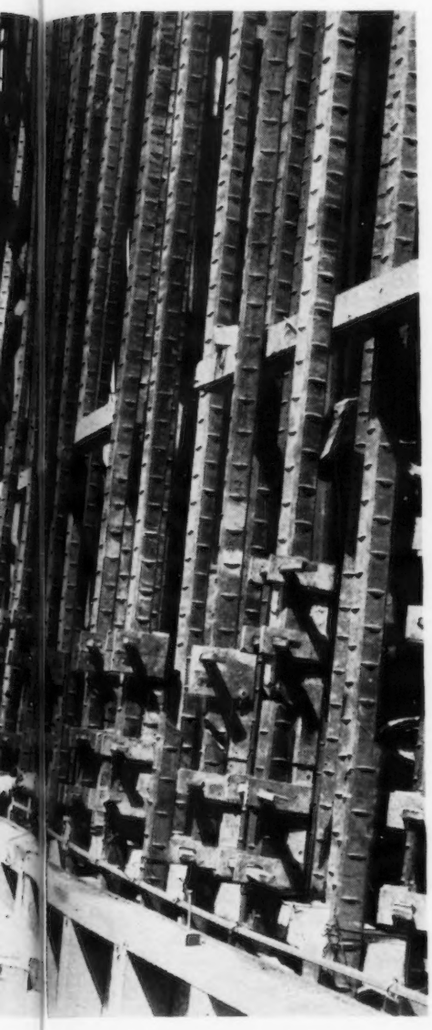
Buy ARMSTRONG TOOLS from your Supply House

ARMSTRONG TOOL HOLDERS Are Used in Over 96% of the Machine Shops and Tool Rooms



STEEL SHORTAGE? While efforts to force a 10-million ton increase in the nation's steel capacity are being made at Washington much steel is going into projects like this. The workman is adjusting a

Modern Tool & Die Co., Philadelphia; gages 7,433
George W. Moore, Inc., Boston; screws 1,356
Morris Wheeler & Co., Philadelphia; steel, reinforcing 1,550
Morse Twist Drill Co., New Bedford, Mass.; mills, taper shank end 1,349
Motor Wheel Corp., Lansing, Mich.; assys., disk and wheel .. 13,790
National Acme Co., Cleveland; machines, screw 59,250
National Electric Products, Economy, Pa.; wire 2,305
National Tool Co., Cleveland; cutters and mills 2,823
Niles-Bement-Pond Co., Pratt & Whitney Division, West Hartford; gages 49,190
shanks, drill 2,650
pumps, oil 1,575
grinders 1,333
North American Iron & Steel Co., Brooklyn; rolling doors 3,320

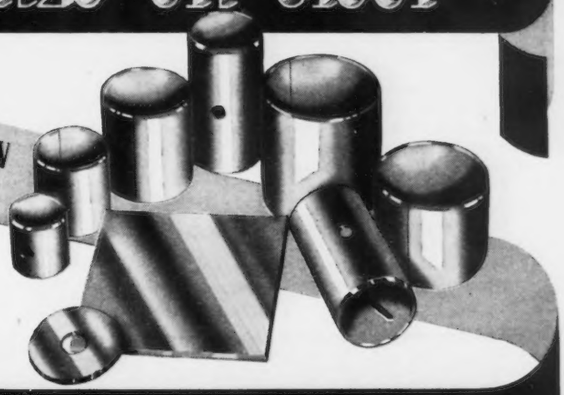


metal clamp used to hold together ends of the 60 ft. bars in the Pit River Bridge, Central Valley project. More than 5400 tons of reinforcing steel have been embedded in the 10 piers and four abutments of the bridge.

Northwest Tool & Engineering Co., Milwaukee; gages 1,298
Norton Co., Worcester; wheels .. 2,782
O.K. Tool Co., Inc., Shelton, Conn.; cutters and mills 1,316
Oilgear Co., Milwaukee; pump for press 4,055
Otis Elevator Co., Buffalo; steel castings 12,251
Otis Steel Co., Cleveland; steel .. 3,537
O. F. Pease Co., Chicago; machines, blue printing 4,080
Penn Instrument Works, Philadelphia; gages, snap 1,560
Pennsylvania Forge Corp., Philadelphia; steel bars and forgings 3,510
Philadelphia Bronze & Brass Corp., Philadelphia; bronze, manganese 37,966
Philadelphia Metal Stamping Co. of Pa., Philadelphia; filler pieces for mechanical time fuze 6,000
Pipe Machinery Co., Cleveland; gages 6,705
Plews Oiler Co., Minneapolis; cans, oil 2,264

Poor & Co., Canton Forge & Axle Works Division, Canton, Ohio; forgings, drip 12,064
Precision Mfg. Co., New York; gages 17,810
Production Tool & Die Co., Inc., Springfield, Mass.; dies, progressive 6,900
Racine Tool & Machine Co., Racine, Wis.; hack saws 1,673
Rahaim Machine & Tool Co., Gardner, Mass.; gages 29,953
Read Machinery Co., Inc., York, Pa.; gun parts 127,050
Red Wing Motor Co., Red Wing, Minn.; plugs and parts for tanks 1,636
Remington Arms Co., Inc., Bridgeport, Conn.; cartridges 20,000
Republic Electric Co., Davenport, Iowa; cable, lead encased 12,532
Republic Steel Corp., Chicago; steel 12,748
Reska Spline Products Co., Detroit; gages 7,294
Revere Copper & Brass, Inc., Rome, N. Y.; bands for shell 48,785
Reynolds Engineering Co., Rock Island, Ill.; gages 14,497
Reynolds Metals Co., Louisville, Ky.; aluminum powder 4,950
Robbins & Myers, Inc., Springfield, Ohio; fans, electric 1,313
Rock Island Metal Foundry, Rock Island, Ill.; castings, bronze .. 7,180

Pre-Cast Bearing
Bronze on Steel
by JOHNSON BRONZE



The Strength of STEEL
The Bearing Qualities of BRONZE

Write for this folder that fully describes this new and unusual bearing. It's FREE.

Pre-Cast Bearing BRONZE ON STEEL was developed to meet the present day bearing requirements of manufacturers in every type of industry. It enables you to increase speeds and loads . . . to gain longer life and smoother operation . . . plus greater resistance to shock and to wear.

Pre-Cast Bearing BRONZE ON STEEL is a thin wall, laminated type of bearing. A high quality bronze alloy is permanently bonded to strip steel. The fabricating process, a series of stamping and forming operations, provides a low unit cost with accuracy and precision.

While *Pre-Cast Bearing* BRONZE ON STEEL was developed primarily for sleeve bearings, it has found many other important applications in industry. It is an ideal metal for stampings, washers or other flat pieces. Available either in rolls . . . up to 400 feet in length . . . or as finished parts, made to your specifications.

Investigate the possibilities of *Pre-Cast Bearing* BRONZE ON STEEL in your product. Complete information—FREE.

JOHNSON BRONZE
Sleeve BEARING HEADQUARTERS
505 S. MILL STREET • NEW CASTLE, PA.

GOVERNMENT AWARDS

B. M. Root Co., York, Pa.; universal saw benches 3,140
Joseph T. Ryerson & Son, Inc., Chicago; steel 4,149
Sheffield Gage Corp., Dayton, Ohio; gages 4,052
W. E. Shipley Machinery Co., Philadelphia; machine, automatic cartridge case end trimming ... 4,845
Sidney Machine Tool Co., Sidney, Ohio; lathe, engine, heavy duty 8,653
Sier-Bath Gear Co., Inc., North Bergen, N. J.; machining and cutting of teeth on pinion blanks 30,800
Signode Steel Strapping Co., Chicago; strappings, strip steel ... 1,520
Simplex Wire & Cable Co., Philadelphia; cable, transmission ... 3,180
Singer Sewing Machine Co., Newark; machines, sewing and drive equipment 11,099
Thomas Smith Co., Worcester; discs, soft steel 7,316
Somerville Machine & Foundry Co., Somerville, Mass.; castings, bronze 2,579
Sparks-Withington Co., Jackson, Mich.; magazines, sub-machine gun 72,000
Sperry Gyroscope Corp., Brooklyn; converters, torque 4,155
Springfield Stamp & Die Co., Springfield, Mass.; steel stamps. 4,485
Standard Alloy Co., Philadelphia; baskets, annealing 12,690
Standard Pressed Steel Co., Jenkintown, Pa.; plugs, firing 1,152
Standard Steel Spring Co., Blood Brothers Machine Co. Division, Allegan, Mich.; parts for tanks 1,083
Star Engineering Co., Newark; guides, bases, pins and punches 5,200
Suburban-Essex Machinists, Inc., Orange, N. J.; gages 37,174
Swind Machinery Co., Philadelphia; unit, continuous pickling and rinsing 5,895
Taylor-Wharton Iron & Steel Co., Easton, Pa.; compressed gas cylinders 8,750
Timken-Detroit Axle Co., Wisconsin Axle Division, Oshkosh, Wis.; transmissions for tanks 127,400
Timken Roller Bearing Co., Canton, Ohio; roller bearings 7,545
Tinius Olsen Testing Machine Co., Philadelphia; machines, testing. 8,550
Towmotor Co., Cleveland; truck, elevating fork, gasoline 2,313
trucks, tilting 6,993
trucks, lift 3,470
Troy Belting & Supply Co., Troy, N. Y.; cutters and mills 3,250
Tungsten Electric Corp., Union City, N. J.; tools 2,757
Turner Uni-Driver Co., Kansas City, Mo.; drives, gear box 3,321
Theo. C. Ulmer Co., Inc., Philadelphia; hardware 1,550
Union Twist Drill Co., Athol, Mass.; tools, cutting 2,781
United Aircraft Corp., Pratt & Whitney Division, East Hartford; controls, oil temperature for tanks 33,884
United Shoe Machinery Corp., Beverly, Mass.; forgings, steel drop 1,866
U. S. Hoffman Machinery Corp., New York; laundry equipment. 2,903
U. S. Metals Refining Co., Carteret, N. J.; solder, in bars ... 1,512
Union Twist Drill Co., Athol, Mass.; tools, cutting 4,847
drills, twist 3,736
cutters 2,106
Universal-Cyclops Steel Corp., Titusville, Pa.; steel 1,042
Vanadium Corp. of America, Niagara Falls, N. Y.; ferrovanadium 28,000
Vascoloy-Ramet Corp., North Chicago; tools 12,300
Veit & Young, Philadelphia; parts for case priming tools 8,263
punches and tools 21,575
Vermont Tap & Die Corp., Lyndonville, Vt.; taps, hand 1,407
Vinco Corp., Detroit; gages 14,641
Warner & Swasey Co., Cleveland; parts, replacements 1,227
Waterbury Farrel Foundry Co., Waterbury, Conn.; machines, corrugating 7,750
S. K. Wellman Co., Cleveland; brake lining and rivets 1,078
Wilkins-Anderson Co., Chicago; balances 1,026
Western Cartridge Co., Winchester Repeating Arms Co. Division, New Haven, Conn.; cartridges .. 3,282
shotguns 16,926
Whitney Chain Mfg. Co., Hartford; assys., chain 2,210
J. H. Williams & Co., Buffalo; forgings 15,221
wrenches 5,904
Wilmington Experimental Station, Wilmington, Del., and Port Ewen, N. Y.; machines, primer mixing 12,500
Wright Aeronautical Corp., Paterson, N. J.; parts for tanks 49,338

WIRE—When in a Jam!

PART of our output goes into defense production—same as yours—but that makes us sympathetic to the problem you are up against to maintain your deliveries.

If you want steel wire—any kind—for current production rather than for inventory, we will do a double loop to get the wire to you.

In fact you don't have to wait for a jam to get the prompt and considerate attention that has made Johnson Steel & Wire Co. a nationally known concern.

From coast to coast you can buy Johnson wire. Branches in Worcester, Akron, and Los Angeles. Tell us about your needs for steel wire of any grade—low to high carbon.

"Three Generations of Wire Drawing"

MAKERS OF HIGH GRADE Steel Wire

JOHNSON STEEL & WIRE COMPANY, INC.

P. O. BOX 1211-MAIN OFFICE & PLANT WORCESTER, MASSACHUSETTS

BRANCH PLANTS AND WAREHOUSES AKRON, OHIO • LOS ANGELES, CALIF.

Yarnall-Waring Co., Philadelphia; joints, gun packet expansion ... 1,861
Youngstown Sheet & Tube Co., Youngstown, Ohio; tubing, seamless, steel ... 36,698
steel for gun mounts ... 2,216
steel ... 3,025
Zimmerman Steel Co., Bettendorf, Iowa; steel castings ... 14,730
Zubler Bearing Co., Philadelphia; punches for bullet blank tools.. 1,278

War Dept., Other Agencies:

Aircooled Motors Corp., Syracuse, N. Y.; engines ... $256,670
American Fork & Hoe Co., Charleston, W. Va.; axes ... 4,380
American-LaFrance-Foamite Corp., Elmira, N. Y.; oxygen cylinder assys. ... 108,145
American Steel & Wire Co., Cyclone Fence Division, Cleveland; fence ... 2,250
American Sterilizer Co., Erie, Pa.; sterilizing outfits ... 101,100
sterilizers ... 138,274
Anaconda Wire & Cable Co., Marion, Ind.; cable ... 10,500
Arnold, Schwinn & Co., Chicago; chock assys. ... 27,582
E. C. Atkins & Co., Indianapolis; saws, butcher ... 3,354
Atlantic Stamping Co., Rochester, N. Y.; dish pans ... 1,210
Atlas Blue Print & Supply Co., Columbus, Ohio; blueprint filing equipment ... 59,246
Bellaire Enameling Co., Bellaire, Ohio; frying pans ... 5,310
Buda Co., Harvey, Ill.; earth augers 121,360
Carver Pump Co., Matherville, Ill.; pumping sets ... 28,729
Chicago Bridge and Iron Co., Chicago; steel water tank ... 39,850
Chris-Craft Corp., Algonac, Mich.; speed boats ... 39,710
Circle Wire & Cable Corp., Maspeth, N. Y.; cable with reels .. 76,044
Clark Equipment Co., Clark Tractor Division, Battle Creek, Mich.; tractors ... 661,323
Colorado Fuel & Iron Corp., Minnequa, Colo.; welded steel fabric, for runways ... 16,100
Combustion Engineering Co., Inc., New York; boiler tubes ... 5,978
H. M. Cornelius Co., N. Quincy, Mass.; staples ... 5,820
Crown Iron Works Co., Minneapolis; ponton sets ... 41,528
Diamond T. Motor Car Co., Chicago; trucks ... 2,028,983
Dicke Tool Co., Inc., Downers Grove, Ill.; bars ... 6,381
Douglas Aircraft Co., Santa Monica, Cal.; airplanes and spare parts ... 10,587,192
Electric Boat Co., New York; Elco Cruisette ... 14,627
Equitable Equipment Co., Inc., New Orleans, La.; steel barges. 154,400
Federal Mfg. & Engineering Co., Brooklyn; tuning units ... 28,500
Fruehauf Trailer Co., Detroit; semi-trailers ... 533,720
Gar-Wood Industries, Detroit; dump bodies ... 195,950
wrecker bodies ... 317,292
parts for bodies ... 14,702
General Cable Corp., Rome, N. Y.; wire with reels ... 659,890
wire ... 2,915,000
General Fireproofing Co., Youngstown, Ohio; steel shelving 133,403
General Motors Corp., Aeroproducts Division, Dayton, Ohio; propeller assys. ... 1,481,088
General Motors Corp., New York; portable vehicle assembly plant equipment ... 180,097
General Refrigeration Division, Yates American Machine Co., Beloit, Wis.; refrigerating units 1,006
Geuder, Paeschke & Frey Co., Milwaukee; dish pans ... 8,208
Giles & Ransome, Philadelphia; diesel tractor equipped with bulldozer ... 9,275
Gladding, McBean & Co., Seattle; sewer pipe ... 14,448
Graybar Electric Co., Point Breeze, Md.; cable and reels ... 88,997
wire ... 7,538
Greenfield Tap & Die Corp., Greenfield, Mass.; dies ... 10,585
W. & L. E. Gurley, Troy, N. Y.; transits, engineers ... 101,480
Hall Scott Motor Car Co., New York; gasoline engines ... 11,250
Ingersoll-Rand Co., Athens, Pa.; nail drivers, pneumatic and saws, circular, portable ... 15,938
International Harvester Co., Fort Wayne, Ind.; trucks ... 3,463,640
Joslyn Co., Chicago; jacks ... 4,594
wire rope ... 1,685
Kaustine Co., Inc., Perry, N. Y.; tanks, fuel ... 6,510
Kennecott Wire & Cable Co., Philipsdale, R. I.; cable and reels. 4,740
Keuffel & Esser Co., Hoboken, N. J.; curves ... 2,516

UNITED STATES STEEL EXPORT COMPANY

30 CHURCH STREET, NEW YORK, U. S. A.

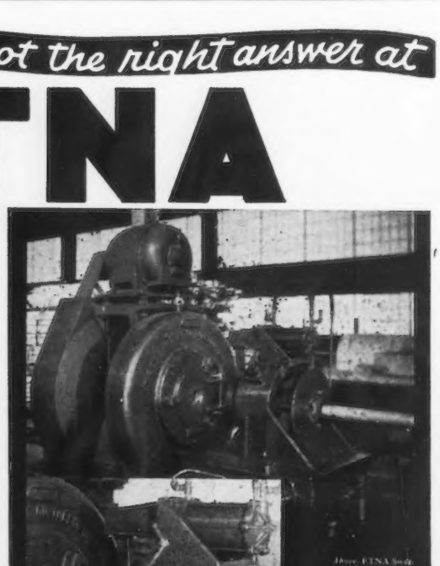
37 YEARS IN THE EXPORT MARKET

Lalance & Grosjean Mfg. Co., Woodhaven, L. I., N. Y.; dish pans 2,499
Lawson Co., New Holstein, Wis.; miscellaneous engine parts ... 3,180
LeRoi Co., Milwaukee; compressors, air 106,550
Lockheed Aircraft Corp., Burbank, Cal.; airplanes and spare parts. 777,830
Lockwood Mfg. Co., Cincinnati; pans, bread baking 1,452
Lord & Burnham Co., Irvington, N. Y.; footbridges 62,667
Mack Mfg. Co., Allentown, Pa.; wreckers, chassis 1,214,742
Glenn L. Martin Co., Baltimore; airplanes and spare parts 80,418,170
May Hardware Co., Washington; vises, machinist 2,694
J. T. McCarthy, Davenport, Iowa; four highway bridges 22,800
National Cine Laboratories, New York; tripods, motion picture .. 5,199
National Enameling & Stamping Co., Granite City, Ill.; frying pans 4,992
Noland Co., Washington; chains and tighteners 22,946
D. W. Onan & Sons, Minneapolis; generator sets 171,950
Phelps Dodge Copper Products Corp., Yonkers, N. Y.; telephone wire with reels 342,975
Pittsburgh-Des Moines Steel Co., Des Moines, Iowa; elevated steel water tank 37,765
"Quick-Way" Truck Shovel Co., Denver; truck-cranes 361,422
Reynolds Metals Co., Louisville, Ky.; plant facilities and equipment for mfr. of aircraft supplies and equipment 415,969
Richardson Boat Co., Inc., North Tonawanda, N. Y.; motor mine yawls 37,400
Rodgers Hydraulic, Inc., Minneapolis; presses, hydraulic portable 2,084
Shepard Niles Crane & Hoist Corp., Philadelphia; jib cranes 23,034
Shwayder Brothers, Inc., Denver; lockers, trunks 675,000
Thos. Somerville Co., Washington; pipe fittings and wrenches 6,577
Sturgeon Bay Shipbuilding & Drydock Co., Sturgeon Bay, Wis.; construction of steel tug 94,869
Tophams, Inc., Washington; shelters and supports 3,675
ponton sets 66,274
Underwood Elliott Fisher Co., Bridgeport, Conn.; machine head 1,140
Union Twist Drill Co., S. W. Card Division, Mansfield, Mass.; dies 25,138
United Aircraft Products, Inc., Dayton, Ohio; strut assys. 595,040
United Aircraft Corp., Hamilton Standard Propellers Div., East Hartford, Conn.; propellers, 3-blade 217,922
United Steel Fabricators, Inc., Wooster, Ohio; steam tunnel cover plates 3,339
United Transformer Corp., New York; coils 85,000
Utica Drop Forge & Tool Corp., Yorkville, N. Y.; pliers 1,950
Watertown Arsenal, Watertown, Mass.; expansion of centrifugal casting plant 3,795,134
Western Electric Co., Point Breeze, Md.; wire with reels 515,540
Whitney Blake Co., New Haven, Conn.; wire with reels 241,175

LEWIN-MATHES *Got the right answer at*

ETNA

They had a job of pointing heavy-walled copper tubing, and wanted to speed up the operation. Just how to do it didn't appear on the horizon, and so Lewin-Mathes did the safe and logical thing—they put their swaging job up to Etna.



The answer to that problem is illustrated on this page. It's a modern Etna Swaging Machine that points ***more*** copper tubes per hour in less time at less cost. If you have a problem involving tapering or reducing tubing and solid rounds—ask Etna about it.

Etna has the swaging machines from 3/8" to 4" and the experience to help you get the most out of this type of machine.

IF IT'S A QUESTION OF TAPERING, SIZING OR REDUCING OF ROUND SOLIDS OR TUBING... "Ask ETNA About Swaging"

ETNA MACHINE COMPANY
TOLEDO OHIO

New High Carbon Propeller To Be Made at Cleveland

Toledo, Ohio

• • • **A high carbon propeller** tip which holds up well against the terrific wind resistance encountered at high plane speeds is reported to be the principal feature of the product which will be turned out at the new American Propeller Corp. plant to be erected here on a site of 450 acres bounded by Laskey, Jackman and Alexis Roads. An RFC loan for around $7,500,000 has been approved and will enable construction of the first unit.

It is understood cold drawn high quality seamless tubing is used for the propellers. One end of the tube, which may be as long as 10 ft., is swaged down, which thickens the tube walls, and the end is then upset to provide the hub. The other end is flattened in a press, welded and the pitch is applied. Placed in a mold and with hyraulic pressure applied, this end is then ballooned. The secret high carbon tip is applied by welding.

As the propeller tip travels at a terrific speed, equivalent to many miles per minute, wind resistance quickly dulls the edge of the prop unless special precautions are taken.

The RFC appropriation will cover a plant 550 x 900 ft., one-story high. Around $1,885,800 will be used for land and buildings and $5,340,240 for equipment, including portable tools. The new company here is a subsidiary of Aviation Corp. of America.

World Tin Output Up in May; Deliveries to United States Fall

New York

• • • **World tin production,** according to the Tin Research Institute, rose in May to 22,200 long tons from 17,100 long tons in April. United States deliveries totaled 10,940 tons in May against 13,955 tons in April.

Production for the five months ended May 31 was 96,000 tons as against 85,400 tons in the first five months of 1940. Deliveries to the United States for the same period in 1941 totaled 65,492 tons.

Census Shows Chicago Factories Increase 9.8%

Chicago

• • • **Gain of 9.8 per cent** in factory establishments within Chicago city limits in 1939 over 1937 is shown in the factory census just released by the U. S. Bureau of the Census. Figures do not embrace the huge greater Chicago area—but are confined strictly to the city's legal limits. Value of the city's manufactured products, wages paid and number of wage earners naturally has increased by a much greater percentage in the past year and a half due to the defense program.

Machinery, except electrical, manufacturers employed more people than any other metalworking industry, according to the census, with 18,300 on the payroll and products valued at $116,037,722. Steel works and rolling mills had 13,582 employed and product value of $105,803,489. (Typical of the expansion that has taken place since 1939 is the fact that the South works of Carnegie-Illinois Steel Corp. now employs in the neighborhood of 15,000).

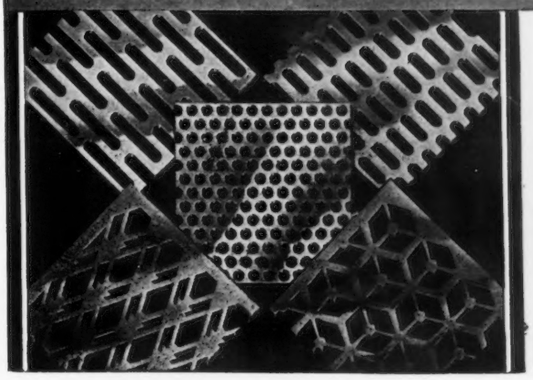
Nonferrous metal products employed 6192; motor vehicles and accessories hired 4498; iron and steel products (except machinery) 9481; machine shop products 4196; machine tools, etc., 2190; gray-iron and semi-steel castings, 1995.

Food and kindred products are the biggest employers of all in Chicago with 25,710 listed.

Rockford Industrial Marketers Get Charter

• • • **The National Industrial** Advertisers Association recently presented a charter to the Rockford Industrial Marketers at a special meeting held at the Faust Hotel, Rockford, Ill. The meeting was attended by representatives of most of Rockford's leading industrial firms and by prominent officials of the N.I.A.A. Highlight of the meeting was a talk presented by Keith J. Evans, the founder president of the N.I.A.A., and sales promotion and advertising manager of Inland Steel Co., and Joseph T. Ryerson & Son, Inc.

PERFORATED METALS



INDUSTRIAL AND ORNAMENTAL

ANY METAL

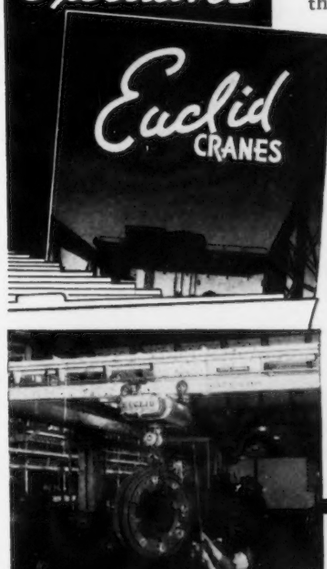
ANY PERFORATION

• Making holes is our entire business and we've made billions and billions of them—little ones, big ones, round, square, oblong and slot holes besides shapely ones in many beautiful designs. Our service is at your command.

The Harrington & King PERFORATING Co.

5657 FILLMORE ST., CHICAGO 114 LIBERTY ST., NEW YORK

FOR THE FILES of all Production Executives



IF you are charged with production responsibilities, you'll want this new Euclid Catalog.

It illustrates and describes the design, functions and adaptability of the various cranes in this long established line.

Units of ½ ton to 100 tons capacity in spans up to 100 feet—

Box Girder Cranes, Single Web Girder Cranes, inexpensive cranes incorporating standard Euclid Hoist Construction—

Cab control or floor control cranes with dual hoisting equipment, or auxiliary hoists—

Cranes for low headroom installation, extra high lifts, and other unusual or special requirements—

You'll want this information in your file, whether there is an immediate need for equipment or not.

THE EUCLID CRANE & HOIST CO.
1361 Chardon Rd. Euclid, Ohio

Electric hoists are also available in a wide range of types and capacities.

Exports of Milling Machines Up in April

Washington

• • • **United States exports** of industrial machinery in April were valued at $40,963,265, or practically unchanged from the March figure of $40,418,406, the Department of Commerce reports.

April exports of machine tools, totaling $19,021,589, were slightly larger than the March shipments which amounted to $17,947,336. This gain was largely due to the increased exports of milling machines to $5,285,184 in April from $3,917,001 in the previous month. Shipments of lathes dropped to $3,503,755 in April compared with $3,738,621 in March, and exports of drilling machines declined to $1,112,884 from $1,303,640. Exports of grinding machines were down to $2,428,440 in April from $2,704,950 in March.

Metal-working machinery other than machine tools was exported in April to the value of $3,359,743 compared with $3,991,579 in March. April shipments of rolling mill equipment totaled $208,001 against $345,825 in the preceding month, while exports of forging machinery dropped to $902,601 from $1,446,715. Foreign sales of sheet and plate metal-working machines amounted to $1,429,735 in April as against $1,515,120 in March.

Shipments of construction and conveying machinery amounted to $2,772,473 in April, a 6 per cent decline from the March total of $2,944,385. Exports of cranes, hoists, and derricks were up to $679,978 from $421,442, and shipments of road graders and scrapers advanced to $540,412 from $472,898 in March. Conveying equipment exports were down to $341,836 from $371,249 and shipments of excavators and parts dropped to $371,220 from $591,789 in the preceding month.

April exports of "other industrial machinery" totaled $6,958,843, a slight gain over the March shipments of $6,727,323. Shipments of ball and roller bearings rose to $1,428,547 from $1,081,760 in March, exports of air compressors dropped to $479,303 from $682,474, and valve shipments showed a small gain to $416,736 from $383,063.

Greenfield Tap Boosts Output 400% in New Plant

• • • **When the National** Defense Program began to take shape, Greenfield Tap & Die Corp. set about increasing its productive facilities, and through the cooperation of the Government, a new plant is in operation today, a plant which will more than quadruple the company's production of these vital tools and at the same time assure a closer accuracy control despite the greatly increased quantity and speed of production.

Ground was broken the latter part of November, 1940, and by April 15 equipment was moving into the new building. All finishing operations, after heat treating, are concentrated in the new building, which explains the attention which has been paid to its most interesting characteristics.

On the second floor, there is a final inspection room, 60 ft. long by 40 ft. wide, separately air-conditioned. It is maintained at 68 deg. F. and 50 per cent relative humidity in accordance with the recommendations of the Bureau of Standards. Fluorescent lighting has been installed throughout the building, maintaining a uniform average intensity of approximately 25 ft. candles, with intensities up to 65 ft. candles, on equipment and at final inspection.

Dedicatory exercises held May 30 were attended by Gen. C. M. Barnes, assistant chief of Industrial Service Office of the Chief of Ordnance, Gen. Stewart, commanding officer of the Springfield Arsenal, Col. Payne and Col. Sears, chief and executive officer of the Hartford ordnance district, as well as many other prominent government and industrial leaders.

A feature was the presentation to Gen. Barnes of the first set of gages made in the new plant. These gages were made and presented by Harry Kellogg, a veteran employee of the company, who has passed his 80th year. By a coincidence, it was this same man who made the first commercial gage turned out by Greenfield Tap & Die Corp. 31 years ago, although gages had been made for the company's own manufacturing purposes many years prior to 1910.

FORD SIGNS: More organized labor history was made last week when Ford Motor Co. signed a union shop contract with the SWOC. Third from the right in this photograph is Harry Bennett, Ford director of personnel, while third from the left is Philip Murray, CIO-SWOC president.

Photo by Harris & Ewing

Ordnance Plants Worth $79½ Million Started in Alabama

Birmingham

• • • **Construction of a** $55,000,000 smokeless powder plant at Alabama Ordnance Works, Childersburg, 48 miles southeast of here, on which more than 6000 men are employed, is progressing on schedule and work is expected to start soon on a $24,675,000 addition for the manufacture of high explosives. Both the powder plant and unit for high explosives are expected to be completed about April, 1942.

Ingalls-Shepard Spends $2,115,000 for Expansion

Harvey, Ill.

• • • **Aircraft engine and** propeller forgings will be made faster by Ingalls-Shepard division of Wyman-Gordon Co., which is spending $2,115,000 for expansion. Construction cost will be $250,000, equipment consuming the remainder. New plants will include forge shop, cleaning, machining and shipping departments, as well as additions for office and service buildings. Listed among equipment to be purchased are four drop hammers at $430,000 total, several steel yard cranes, presses and furnaces. Employees will be stepped up from 1300 to 1600. Firm has 16 million dollars worth of aircraft forging orders on hand.

Bolt, Nut Standards Book Issued

Cleveland

• • • **A revised edition** of its standards book has been issued by the American Institute of Bolt, Nut and Rivet Manufacturers, in the Hanna Building here. It contains approximately 170 pages, is leather-bound and fully indexed. The book is being sold at $1 per copy. First issued in 1935, "Bolt, Nut and Rivet Standards" assists users by acquainting them with accepted definitions, dimensions, sizes and other data. The volume was prepared under the supervision of the Institute Committee on Standards and Technical Practices.

Carnegie-Illinois Plans $85 Million Expansion

Washington

• • • **Approved by OPM Director General William S. Knudsen as "definitely necessary" in the interest of national defense, the Defense Plant Corp. is expected quickly to agree to finance the projected $85,000,000 expansion plan at the Homestead and Duquesne, Pa., plants of the Carnegie-Illinois Steel Corp. to speed up the Navy building program. The new production will consist of additional armor, special treatment steel and heavy forgings.**

The company requested that the government finance the undertaking, as pointed out by Mr. Knudsen in a letter addressed to Federal Loan Administrator Jesse H. Jones. The bulk of the expansion, calling for a $75,000,000 outlay and a 400,000-ton increase in ingot capacity, will be made at the Homestead plant.

The development at Homestead includes the construction of an armor forging and machining shop, a new open hearth plant, a new slabbing mill, a 160-in. plate mill and a stripper unit. It will call for the purchase of additional property and relocation of railroad facilities. At the Duquesne plant the $10,000,000 outlay will provide for an electric furnace steel plant and a steel heating plant which also will make necessary the purchase of additional land. No further details were made public, though Mr. Knudsen in his letter to Mr. Jones submitted what he called an "overall program." He said it is OPM's understanding that a further detailed breakdown will be submitted at a later date.

"We have reviewed this proposed program and in our opinion the facilities identified are of the type necessary to produce the above products and are needed in order that the construction of the ships for the United States Navy may proceed without interruption or delay," said Mr. Knudsen.

Third Monarch Addition Puts 1941 Output 126% Over 1940

Sidney, Ohio

• • • **Production for the first** six months of 1941 by Monarch Machine Tool Co. was 126 per cent over that of the same period last year, Wendell E. Whipp, president, announced. Monarch recently completed a $650,000 addition to the plant, its third in eighteen months. The entire output is going into the defense program of the United States and England.

"Production for the full year is expected to be at least double that of 1940," Mr. Whipp said, "despite the tremendous volume of orders turned out the second half of last year." The number of lathes produced in 1940 was two and one-half times that of 1939.

Chamber Writes on Zirkite

• • • **The June, 1941,** issue of Foote-Prints, published by the Foote Mineral Co., Philadelphia, contains an article by Gordon H. Chamber, vice president of the company, on "Zirconia in Brazil." Brazilian zirkite is the raw material used in making the series of zirconium ferroalloys which are now important in the steel industry.

Studebaker Will Build 1000 Plane Engines Monthly

South Bend, Ind.

• • • **Airplane engine production** of 1000 a month by three new Studebaker plants has been estimated by Harold S. Vance, chairman of the board. Originally, plans called for production of 600 Wright motors, but officials believe they can hit the 1000 figure before the plants have been running a year. The plants, now under construction, will be located in Chicago, Ft. Wayne, and South Bend, and will employ a total of 10,400.

1100 Study Plane Engines In Illinois Tech Course

Chicago

• • • **A total of 1100 students** is enrolled in summer airplane engine defense training course at the Illinois Institute of Technology here. The course will last 10 weeks, giving students 39 hr. of classroom work each week. Instruction is given in engine testing, metallurgical inspection, production inspection, mechanical design, heat treatment and pyrometry.

OPM Plans 75% Rise In Aluminum Output; U. S. to Collect Scrap

Developments in the aluminum situation last week include announcement of plans to increase U. S. aluminum output to 1,400,000,000 lb. annually by building eight new reducing plants and disclosure that the Office of Civilian Defense was preparing a nationwide collection of old aluminum household equipment to raise an estimated 20,000,000 lb. of scrap metal. Scrap dealers will aid in handling collected material.

Washington

• • • **An eventual aluminum** producing capacity of 1,400,000,000 lb. a year for the United States, as compared with present output of about 800,000,000 lb. annually, an increase of 75 per cent was forecast late last week by an announcement that locations of eight new aluminum plants having an annual capacity of 600,000,000 lb. annually had been recommended to the Office of Production Management. The recommendations were based on a joint study of the aluminum situation by the Federal Power Commission and the power section of the OPM.

The recommended locations are scattered throughout the country and include Arkansas, Oregon, Upper New York, Alabama, California and North Carolina. In making the announcement it was said that the committtee took into consideration the question of economic post-war operation of the plants, the possibility of building new power facilities as rapidly as the plants are constructed, and the possibility of taking temporary measures, where necessary, to assure sufficient power for reduction operations.

The new plants will be owned by the government, according to present indications, but privately operated under a lease arrangement. Names of the companies which will operate the plants were not given.

The new program is designed to anticipate the greatly expanded aluminum needs of the stepped-up aircraft building program. A summary of the recommended aluminum expansion follows:

Proposed Aluminum Plants

Location	*Yearly Capacity in Pounds*	*Power Requirements (Kilowatts)*
Arkansas ...	100,000,000	120,000
Oregon	85,000,000	97,500
Washington ..	55,000,000	65,000
New York (1st Plant)	50,000,000	60,000
New York (2nd Plant)	100,000,000	120,000
Alabama	100,000,000	120,000
California ...	70,000,000	85,000
N. Carolina ..	40,000,000	48,000
Total	600,000,000	715,500

New York

• • • **Plans for a house-to-house** collection of an estimated 20,000,000 lb. of old aluminum household equipment as utensils, wire, golf clubs, etc., were revealed last week by Mayor F. H. LaGuardia, head of the Office of Civilian Defense. This estimate, based on recent test collections at Madison, Wis., and Richmond, Va., will release sufficient virgin aluminum for the construction of 2000 fighter aircraft, Mayor LaGuardia said.

Governors of the various states will be in charge of operations in their states. They in turn will organize individual communities for the actual collection. It is expected to make use of such groups as the American Legion, Veterans of Foreign Wars, Boy Scouts, etc. The communities will provide the required transportation. The nation's scrap metal dealers will act as reception depots and will handle the scrap metal without charge.

Scrap aluminum is not used directly in aircraft production, but the metal collected in this drive is expected to release an equivalent amount of virgin metal from other defense uses for direct aircraft work.

Washington

• • • **The OPM has announced** that representatives of scrap metal trade associations will cooperate with campaign officials in arranging for the sorting, preparation and sale of aluminum contributions without compensation. Labor employed in actual segregation and preparation will be paid for at regular rates by local committees.

Representatives of the scrap industry proposed that plans be drawn up at a later date for the collection through regular trade channels of all other types of scrap in which conservation measures are contemplated.

Represented at the meeting with OPM was the National Association of Waste Material Dealers, the Empire Metal Merchants Association of New York, the Philadelphia Metal Association, and an unaffiliated group of Chicago.

Aluminum For 280 Airplanes Saved by Two Manufacturers

Chicago

• • • **About 150 airplanes for defense will have aluminum this year thanks to savings made by Western Electric Co., producer of Bell telephones, in using substitutes. Enough zinc will be saved to make nearly 12 million 8-in. anti-aircraft shells. Western Electric's substitution program began several years ago when studies were instituted in this direction. The company has or will make substantial reduction in requirements of nickel steel, nickel, magnesium, tungsten, and other vital metals.**

Mansfield, Ohio

• • • **With substitute materials, Westinghouse Electric & Mfg. Co. here has saved enough aluminum in the manufacture of refrigerators, ranges, washing machines and other appliances to build 130 bombing planes. According to A. W. Robertson, chairman of the board, more than 1,500,000 lb. of aluminum have been saved. Other vital defense materials conserved by use of alternate materials included 150,000 pounds of nickel and 100,000 pounds of zinc.**

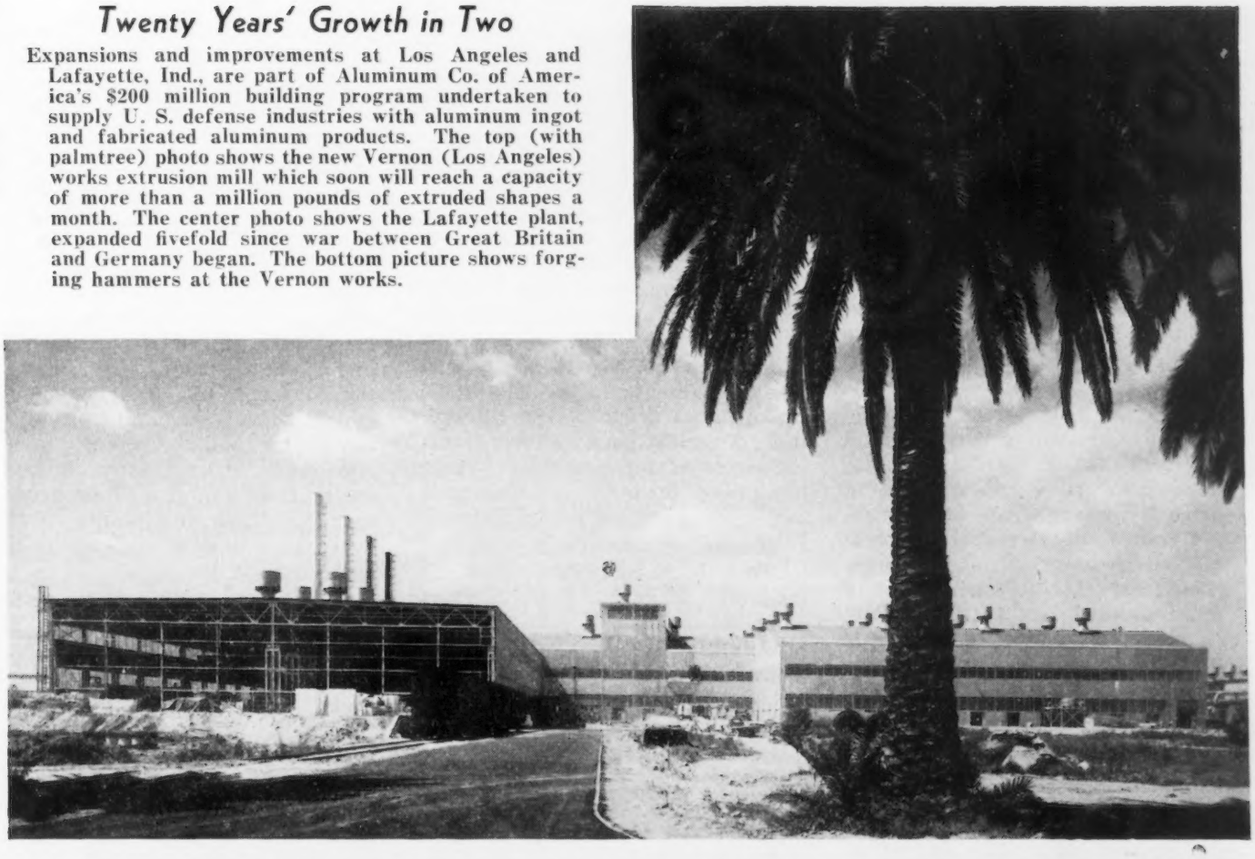
Bill Would Give U. S. Courts Authority in Strike Cases

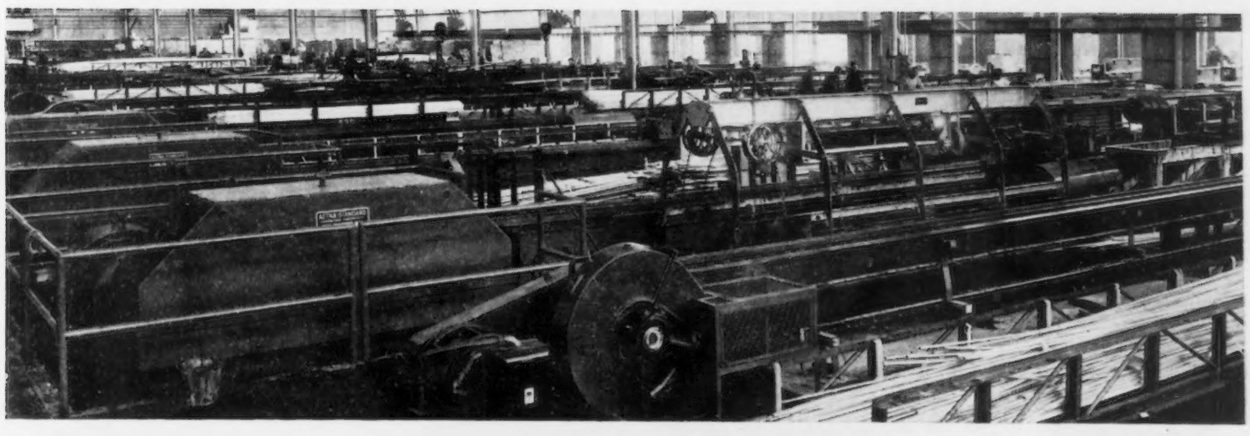
Washington

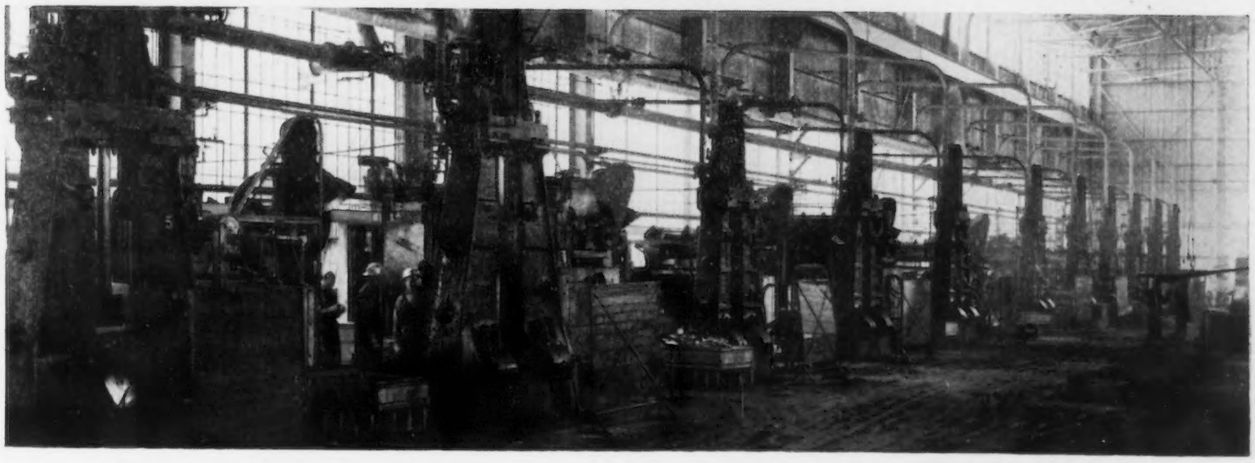
• • • **United States District** Courts would be given jurisdiction in industrial disputes threatening work stoppages under a bill introduced in Congress by Rep. Francis E. Walter, Democrat of Easton, Pa.

Twenty Years' Growth in Two

Expansions and improvements at Los Angeles and Lafayette, Ind., are part of Aluminum Co. of America's $200 million building program undertaken to supply U. S. defense industries with aluminum ingot and fabricated aluminum products. The top (with palmtree) photo shows the new Vernon (Los Angeles) works extrusion mill which soon will reach a capacity of more than a million pounds of extruded shapes a month. The center photo shows the Lafayette plant, expanded fivefold since war between Great Britain and Germany began. The bottom picture shows forging hammers at the Vernon works.







Ceiling Set on Pig Iron Prices

Washington

• • • **Office of Price Administration** and Civilian Supply on June 25 established maximum prices for the sale of pig iron, the third major item in the iron and steel industry on which ceilings have been established, the others being scrap and iron and steel products.

The maximum prices are those generally prevailing in the second quarter. According to the announcement, the domestic ceiling price is the aggregate of the basing point base price at the governing basing point, with transportation from the governing basing point to the place of delivery as customarily computed. Usual differentials for analysis still apply.

The export price was described as consisting of the basing point price at the governing basing point (may be the established basing point at or nearest place of production) plus analysis differentials and export transportation as ordinarily computed.

The ceilings apply to basic, foundry, malleable, low phosphorous, high silicon or silvery, gray forge, charcoal, etc., commonly produced in blast furnaces. Base prices set by OPACS were identical with those published in THE IRON AGE.

↓ ↓ ↓

Pittsburgh

• • • **A governing basing** point method producing the lowest delivered price, an increase of 25c. a ton for each 25 points of silicon over base content, and the establishment of a 50c. a ton differential for each 50 points of manganese in excess of 1 per cent were main features of the pig iron ceiling price order setup last week by OPACS.

Heretofore the silicon differential for each 25 points above the base of 1.75 to 2.25 per cent was 25c., as compared with the new differential of 50c. for each 25 points.

The differential on manganese, which previously did not exist, is believed designed to discourage use of high manganese irons. However, it is reported that most of the irons now being shipped carry a manganese content sufficiently high to permit charging manganese differentials under the new setup. Thus to some consumers, prices will be advanced on the basis of the new manganese differentials.

The phosporous differential is the same as has been the practice heretofore, with a deduction of 38c. a ton required for irons with 0.70 per cent phosphorous or over.

The exception allowing Pittsburgh Coke & Iron Co. a 50c. a ton premium at its Sharpville furnace and Struthers Iron Co. the same amount at its Struther furnace is in line with prices now being charged by those companies, except for basic iron on which they were charging $1 a ton higher than the ceiling prices. Apparently until later adjustments are made it will be necessary for these two plants to reduce their present quotations on basic iron to 50c. a ton.

It is assumed that these firms were allowed the exception in view of the fact that both use outside sources for iron ore and are also compelled to use beehive coke from the Connellsville regions, which runs their costs higher than units using their own by-product coke. Other furnaces which would have the same conditions are expected to seek relief from OPACS.

Some surprise was noted in the pig iron trade that it was not allowed the same interpretation on governing basing points as was allowed the steel industry. The latter can also use the basing point nearest the point of production for steel products, but pig iron makers can only use this method when quoting on export inquiries. Requests for relief may be forthcoming in view of the trend towards allocation of pig iron for defense purposes.

See page 138 for official maximum prices

DISMANTLING JOB: This captured German tank is being taken apart to see how it runs by a British engineer in North Africa.

Photo By British Combine

Botwinik Brothers Move to Seven-Acre New Haven Site

• • • **Botwinik Brothers, Inc.**, machine tool rebuilders, will move on July 7 to a new seven-acre site in New Haven, Conn. The new plant and offices, occupying more than 70,000 sq. ft., and equipped with three cranes aggregating 35 tons in capacity and running the length of the building, on the main line of the New York, New Haven & Hartford Railroad.

Tower: Other Trade Group Men Dropped, Union Leaders Stay

Washington

• • • **The strange Administration** policy of barring paid trade association executives from positions in defense agencies, while at the same time maintaining paid trade union executives in high positions in the defense program, has brought about the resignation of another highly trained industrial expert from the OPM, Walter S. Tower, president of the American Iron and Steel Institute. Mr. Tower was producers representative on the iron and steel priorities committee and immediately after the policy was adopted he offered his resignation, but some officials in the organization doubted that Mr. Tower would be affected by the policy since he was officially engaged as a representative of the steel industry. Predictions are made however, that Mr. Tower will continue to be an important consultant on steel in the defense program. This was indicated at the OPM by the statement that he likely will be chosen in this capacity as a member of the steel advisory committee under the reorganized OPM.

Prohibiting of trade association executives from defense agency positions is said to be definitely an Administration policy rather than merely an OPM policy. The latter agency, however, was the first to enunciate it. It did so when C. W. Kellogg, president, Edison Electric Institute, resigned as OPM consultant on heat, light and power. Mr. Kellogg resigned after OPM officials repudiated a statement by Mr. Kellogg at Buffalo that there was no shortage of electric power. Many believe that this gave the Administration its desired cue to establish its policy of ousting trade association executives from defense agency positions.

The resignations of Samuel R. Fuller, Jr., OPM Materials Branch Chief, and R. C. Allen, consultant on ferrous metals in that branch had no relation to the policy ousting trade association executives from defense positions. Their resignations are attributed to the growing conflicts of policies within the two outstanding government defense agencies themselves, the OPM and the OPACS.

Mr. Fuller and Mr. Allen are said to have held that in order to insure more sorely needed supplies of iron and steel scrap a shipping point price of $12 a gross ton for No. 2 heavy melting material in remote areas was necessary. OPACS flatly turned down the recommendation.

Auto Men Meet OPM On Production Cut

Washington

• • • **Representatives of the automobile industry were scheduled to meet with OPM officials on Wednesday to select a defense industry advisory committee and discuss a proposed further curtailment of automobile production.**

OPM Director of Production John D. Biggers told manufacturers that the curtailment step had been made necessary by shortages of critical materials and because the industry's resources are needed for greater defense production.

Presiding at the Wednesday meeting was James S. Adams, recently-named chief of OPM's new automotive industry section. Mr. Adams was former chief of OPM's agriculture and forest products section, materials branch of the production division.

Studebaker's Plane Engine Backlog Lifted by $65 Millions

South Bend, Ind.

• • • **As many machine tool** manufacturers and other suppliers involved in the project had guessed several months ago, Studebaker's production of aircraft engines has been more than doubled. Letter of intent was issued by the War Department last week, informing the Studebaker Corp. that its production of Wright engines and spare parts would be upped by 65 million dollars. This, in addition to the original order, brings the total to more than 100 million. Studebaker officials declined to comment upon the addition when notified of the letter of intent. The automobile firm is building three plants in Ft. Wayne, Chicago and South Bend expressly for Wright engine production.

War Dept. Awards Two Contracts for Bombers

Washington

• • • **The War Department** has announced the award of two large contracts for medium bombardment airplanes to be assembled at government-owned plants being constructed at Omaha, Neb., and at Kansas City, Kan.

A $166,261,526 contract was awarded to the Glenn L. Martin Nebraska Co., which will operate the Omaha plant. The Chrysler Corp., Hudson Motor Car Co. and the Goodyear Aircraft Corp. are designated as the major sub-contractors.

A $127,440,000 contract was awarded to North American Aviation, Inc., which will operate the Kansas City plant, with the General Motors Corp., Fisher Body Division, as the major subcontractors.

G-E to Spend $70 Million On Supercharger Tooling

Washington

• • • **The War Department** has announced the award of a letter of intent to General Electric Co., Schenectady, N. Y., with the approval of the OPM, for manufacture of superchargers, which will be produced in plants at Fort Wayne, Ind., Everett and West Lynn, Mass. This letter guarantees reimbursement to General Electric to the extent of $70,000,000 for purchase of jigs, dies, tools, fixtures, material, and equipment necessary to production of these superchargers.

West Coast Machinists Vote to End Strike

San Francisco

• • • **San Francisco and Oakland** shipyard machinists voted to end their strike last week after the Navy had set up Civil Service Registration for men to replace the strikers. Conditions under which the strikers, out since May 10, return to work essentially comprised terms originally offered by employers, and dissatisfaction was still expressed by strike leaders, who threaten further work stoppage. The men were scheduled to return to work June 30.

House Report Finds Steel Industry Left In Dark On Expansion

Washington

• • • **A neglect in** increasing steel producing facilities was charged last week by a special House committee investigating the defense program. Such neglect developed, the committee reported, "principally because we could not or would not give definite assurance to industry as to what it might expect from a wartime expansion of its plants."

Prepared by a House Military Affairs Sub-committee headed by Representative Faddis, Democrat, of Pennsylvania, the report was outspoken in its denunciation of the defense efforts of Administration officials and Congressional members as well. It broke its findings down into six specific complaints, alleging that in concentrating its efforts on social reform, the country forgot that "without national security, social reform might well prove meaningless." It charged, too, that there has been a complete absence of a "coherent organization" for defense and that the Administration had attempted to dispose of difficult problems by creating additional boards and bureaus "only to add to the confusion of the assortment of agencies we now have."

The committee submitted these complaints after receiving weeks of testimony in executive session:

1. Failure on the part of Congress, the Administration and the public to initiate a stock pile program at an earlier date. Congress, the Administration and the country were so concerned with the depression, that the pleas of a minority of government officials, technical organizations and farsighted members of Congress, who foresaw the possible raw material shortage, went unheeded. The initial stock pile program authorized by Congress was far too inadequate.

2. Failure to entrust to a responsible head the full authority to carry out the will of Congress in the legislation enacted. Lack of coordination and absence of a responsible head with authority and power to fix responsibility has brought deficiencies all along the line. Plagued by an absence of coherent organization, overblessed with numerous boards and committees, the defense organization has resulted in deadly consuming of time. In the end "we still have a divided authority."

3. Failure of a sense of urgency on the part of officials of purchasing organizations. Persistently using outmoded methods of purchasing, the Treasury Department's Procurement Division, for example, has been hampered by statutory restrictions imposed by Congress, too rigid specifications laid down by government agencies, failure of prompt appropriations, and delays introduced in purchasing procedures by various advisory agencies.

4. The delay in establishing conservation methods and the use of substitutes for fear of creating unemployment. The automobile industry whose needs are almost identical with those of the defense program, was too long allowed to consume sorely needed defense materials in the first year of the defense effort. Government officials lacked vision in their reluctance to restrict automobile production, and government agencies failed by not educating the public long ago on the necessity of not squandering the materials used in defense production.

5. Unwarranted delays in building plants and facilities for the conversion of raw materials into finished products. Government and industry experts have been too complacent in seeking to allay fears of shortages for wartime needs, they were negligent in their failure to stress the necessity of steel expansion, the situation in regard to aluminum is more critical still, and a squabble at this time on the subject of monopoly is a tragic and sorry spectacle, indeed.

6. The effect of shipping shortages in the program for the acquisition of strategic and critical raw materials. There has been a lack of appreciation on the part of the Maritime Commission and individual ship operators of the urgent need for the accumulation of stock piles of strategic raw materials, and the commission has failed to provide adequately for the movement of such raw materials by use of tonnage directly or indirectly under its control.

Republic's May Output Reaches 703,091 Tons

Cleveland

• • • **Steel ingot production** by Republic Steel Corp. is stated to have increased to 703,091 tons during the month of May, while the company's payroll rose to 67,656 persons and its percentage of operation to 103.4 per cent.

T. M. Girdler, chairman, and R. J. Wysor, president, pointed out that the steel industry would have an ingot capacity by the end of 1941 of 91,000,000 tons, and that defense and British requirements will utilize approximately 23,000,000 tons. With the addition of two new 50-ton electric furnaces, Republic will have increased its electric furnace steel capacity from 146,000 tons in 1939 to more than 725,000 tons in 1941. Republic is now producing enough light armor plate, fabricated for immediate assembly, for 200 tanks a month and has a capacity for 7000 tons of light armor plate monthly which must be fabricated by the producer of the tank.

SWOC Wins NLRB Vote In 5 Bethlehem Plants

• • • **The CIO Steel Workers'** Organizing Committee last week won collective bargaining elections, under National Labor Relations Board auspices, at five plants of the Bethlehem Steel Co. These five divisions will be joined with the Lackawanna, N. Y., plant of the company, where the SWOC in May won the first NLRB election to be held in a Bethlehem plant, in a single bargaining unit with which the company will negotiate a wage contract.

The total vote in last week's elections was 10,460 to 2,388, divided as follows: Cambria Works, Johnstown, Pa., SWOC 8940, no union 2108; Leetsdale, Pa., SWOC 599, no union 103; Rankin, Pa., SWOC 329, no union 16; Los Angeles (two plants) SWOC 592, no union 61. The Lackawanna vote was SWOC 8223, opposed 2961.

Personals

Change is inevitable in progressive Industry. Change is constant.

• **Edwin C. Stout,** who has been identified with the Wickwire Spencer Steel Co., New York, since 1920, has been appointed sales manager of the wire department. **C. G. Matthews,** who has served the company in the wire sales department for the past 18 years, has been made assistant sales manager. For a time, Mr. Stout represented the company in a sales capacity in Ohio and was transferred to New York as sales manager of the springs department in 1924. He later held the positions of assistant sales manager of the combined wire and springs department, and Eastern district sales manager.

• **W. W. Rector** has been elected a vice-president and director of American Fork & Hoe Co., Cleveland. He has been associated with farm implement and sporting goods manufacture for four years. He will have the additional title of merchandising director.

• **Ralph M. Fawcett** has been elected president of Republic Stamping & Enameling Co., Canton, Ohio, succeeding his brother, **Howard B. Fawcett,** who was named chairman of the board.

• **Robert J. Minshell,** Seattle, Wash., vice-president of Boeing Airplane Co., has been named president of Pump Engineering Service Corp., Cleveland. He succeeds **D. E. Gamble,** who will become vice-president of Borg & Beck Co., Chicago.

EDWIN C. STOUT, sales manager of the wire department of Wickwire-Spencer Steel Co.

• **R. F. Horn** has been appointed divisional superintendent of the south stainless division at Canton, Ohio, for Republic Steel Corp., in addition to his present duties as divisional superintendent of the Stark sheet division and the Massillon armor plate plant. **R. S. Lynch,** superintendent of the stainless division at Canton and the Enduro stainless plant at Massillon, has been named divisional superintendent of the Massillon steel division, retaining supervision of the Massillon stainless division.

• **R. C. Allen,** ferrous minerals consultant in the materials branch, production division of the OPM, has been granted an indefinite leave of absence to return to his position as executive vice-president of Oglebay, Norton & Co., Cleveland.

• **Robert M. Reid,** heretofore chief of the rate bureau in the traffic department of the Tennessee Coal, Iron & Railroad Co., Birmingham, has been appointed an assistant manager in that department. Mr. Reid joined the Tennessee company in 1917, as a rate clerk in the traffic department. He was promoted to the position of chief rate clerk in 1922 and became chief of the rate bureau in 1938.

• **Ross O. Laub** has been appointed plant industrial engineer at the Gary sheet and tin mill of Carnegie-Illinois Steel Corp., succeeding **Howard J. Stephens,** who has been transferred to the company's Pittsburgh office. Mr. Laub has been associated with the sheet and tin mill for the last 14 years. He started as a draftsman. He became assistant plant industrial engineer last February and served in this capacity until receiving his current promotion. Prior to his Gary work he served two years in one of the company's smaller plants.

• **Clyde DeLong,** who joined the B. F. Goodrich Co., Akron, Ohio, in 1928 as a clerk in the mechanical division, has been named operating manager of the mechanical sales division.

• **Campbell Wood,** heretofore assistant to the president of the Nash-Kelvinator Corp., Detroit, with offices in Washington, has been appointed manager of the company's new airplane propeller division which is now being set up in Lansing, Mich. **E. F. Keller,** of the Nash Motors division of the corporation, will be factory manager and **B. E. Ball,** former production manager of the Kelvinator division, has been made production manager of the new division. **B. E. Chapman,** plant engineer for the Nash Mo-

R. G. KOCH, whose appointment as vice-president of H. Boker & Co., was announced in these columns last week.

tors division at Kenosha, has been transferred to the propeller division in a similar capacity. **D. E. Ellis**, who has been connected with the Kelvinator engineering staff for a number of years, has become purchasing agent of the new division.

• **Theodore J. Kauffeld,** who joined American Type Founders last year as manager of the product division, has been elected a vice-president.

• **James A. Trail,** heretofore associate professor in mechanical engineering at Agricultural and Mechanical College of Texas, has joined the Hyatt Bearings division of General Motors Sales Corp., Harrison, N. J. He will cover the Southwest territory, with headquarters in Dallas. **A. J. Swisler,** who formerly handled this territory, has been transferred to the Western division headquarters in Chicago.

• **R. L. McIlvaine,** formerly president of the McIlvaine Foundry Conveyors Co., has joined the engineering staff of the National Engineering Co., Chicago.

• **Joseph M. Marshall, Jr.,** heretofore engineer inspector for the PWA in Georgia, has been made district engineer with headquarters in Atlanta, of the American Institute of Steel Construction, N. Y.

• **Charles B. Durgin,** of Anniston, Ala., group leader in the research department of the Monsanto Chemical Co., phosphate division, has been named director of research. During the last three years he has been in charge of application of research for the phosphate division. His successful development of new and important uses for tri-sodium phosphate and phosphoric acid in the metal treating field have broadened uses for these products.

• **E. T. Slackford,** advertising manager of Harnischfeger Corp., Milwaukee, has been selected president of the Milwaukee Association of Industrial Advertisers. Other officers elected at the annual outing meeting were **Forrest J. Nelson,** MacWhyte Co., Kenosha, Wis., vice-president; **M. E. Engebretson,** Oilgear Co., Milwaukee, secretary-treasurer, and directors, **Jackson Hazelwood,** Gisholt Machine Co., Madison, Wis., and **A. H. Oberndorfer,** Hevi-Duty Electric Co., Milwaukee.

• **Frederick U. Conard,** vice-president of the Underwood Elliott Fisher Co., has been made a vice-president of the Manufacturers Association of Hartford County, Conn.

Trade Notes . . .

The Chicago office of the Evanston Stamping Co., formerly Nilles Stamping Co., is being transferred to a new factory addition at Evanston, Ill.

•

Arcos Corp., 401 North Broad Street, Philadelphia, manufacturers of electrodes for welding stainless steels and alloys, announces the publication of a new stub end identification color chart. A copy will be sent by the company upon request.

•

Standard Heater & Oil Equipment Co. has appointed the Alpha Steam Specialty Co., 15 Park Row, New York, as manufacturers' representatives for the complete line of heat exchangers in the metropolitan area of New York.

•

National Bronze & Aluminum Foundry Co., Cleveland, has purchased three new heat treating furnaces, consisting of two radiant tube gas fired batch type horizontal furnaces and one direct fire giving flexibility in handling a wide range of alloys required for all work. With the three furnaces in operation the company will have a capacity of 38,000 lb. daily.

•

Lord Mfg. Co., Erie, Pa., manufacturer of bonded rubber mountings, announces the opening of a district office at 4937 Laclede Avenue, St. Louis. The office will be in charge of George Harrington.

Donberg & Danits, used and rebuilt machine tool equipment dealers has been formed by Joseph Donberg and Samuel Danits, formerly connected with the Louis E. Emerman Co. The new firm is located at 548 West Washington Blvd., Chicago.

•

Production Machine Co., Greenfield, Mass., has taken over the manufacture of the line of plain and universal tool and cutter grinders formerly manufactured by the Greenfield Tap & Die Corp.

•

Maute Die and Tool Works has moved its factory to 861 Jefferson Avenue, Buffalo.

•

Peerless Pump Division, Food Machinery Corp., announces it is established in a new and larger Eastern factory at 1250 Camden Avenue, S.W., Canton, Ohio.

•

Industrial Products Co., maker of safety equipment, has moved from 800 West Somerset Street to larger quarters at 2820 North Fourth Street, Philadelphia.

•

The Lauson Mfg. Co., New Holstein, Wis., maker of small engines and outboard motors, has been purchased by the Hart-Carter Corp., Peoria, Ill., parts maker for agricultural machinery. The Lauson company will continue to operate as usual with no change in officers, according to E. A. Longenecker, who remains as president.

Obituary

• **Leslie C. Jacobson,** superintendent in charge of fabrication departments of Carboloy Co., Detroit, died in that city on June 24, aged 51 years. He had been associated with the company as a production executive since 1937, and prior to that had been with the Union Wire Die Corp. for a period of 15 years.

• **William H. Braley,** sales engineer with Peter A. Frasse & Co., New York, died on June 16, aged 53 years. He was formerly connected with the Ellwood City plant of National Tube Co. in an engineering capacity.

• **Roy L. Smith,** aged 52, superintendent of construction for Koppers Co., engineering and construction division, died June 22 at his home in Pittsburgh. Mr. Smith was successively associated with Chaney & Armstrong, Washington, Pa., the Pennsylvania Department of Highways, and the Lake Erie and Ohio River Ship Canal Board from 1910 to 1916, when he joined the Koppers organization. He was a field and erecting engineer until 1925, when he was made assistant superintendent of construction. He was made superintendent of construction in 1936, which position he held at the time of his death.

• **Thomas Joseph Bray, Jr.,** an official of Carnegie-Illinois Steel Corp., Pittsburgh, died last week in Sewickley Valley Hospital after a short illness following an emergency operation. Mr. Bray was 43. His home was in Persimmon Road, Sewickley Heights, and he was sales manager of the bar and semi-finished steel division of the steel company.

A native of Pittsburgh, Mr. Bray was a son of the late Thomas J. and Isabelle Matthews Bray. His father for a time was president of Republic Iron & Steel Co. and later was a vice-president and director of the Youngstown Sheet & Tube Co. Mr. Bray attended Shady Side Academy, the Hackley School and Lehigh University. He formerly was employed by the Republic Steel Corp. in Youngstown and by the Koppers Co. in Chicago and Pittsburgh.

Metal Working Activity

. . . *Latest Data Assembled by The Iron Age*

From Recognized Sources. In Net Tons.

	May 1941	April 1941	April 1940	4 Months 1941	4 Months 1940
Steel Ingots:					
Monthly output[a]	7,101,759	6,757,728	4,100,722	27,097,597	18,786,682
Average weekly output[a]	1,603,106	1,575,228	955,879	1,231,709	853,440
Per cent of capacity[a]	99.3	97.6	61.2	97.9	69.9
Pig Iron:					
Monthly output[b]	4,599,966	4,334,267	3,137,019	18,269,837	13,751,020
Raw Materials:					
Coke output[c]	5,387,054	4,567,315	4,086,747	20,597,704	17,464,005
Lake ore consumed[d]	6,232,213	5,802,088	3,034,853	24,217,803	17,553,767
Scrap iron consumed	.....	4,406,000	2,548,000	17,518,000	11,669,000
Castings:					
Malleable, orders[e]	.....	84,751	35,290	328,188	146,359
Steel, orders[e]	.....	152,007	41,353	493,851	161,999
Finished Steel:					
Trackwork shipments[a]	11,012	11,751	7,654	36,784	29,760
Fabricated shape orders[f]	165,186	212,320	73,780	872,167	382,672
U. S. Steel Corp. shipments[g]	1,745,295	1,687,674	6,638,945	907,904	3,994,657
Fabricated Products:					
Automobile production[h]	.....	462,257	432,746	1,956,579	1,692,677
Steel furniture shipments[e], value	.....	.....	$2,008,428	.....	$8,960,330
Steel boiler orders[e] (sq. ft.)	.....	2,339,037	878,259	9,614,656	2,731,490
Locomotives ordered[i]	128	68	77	392	181
Freight cars ordered[i]	19,221	16,091	2,456	43,539	7,534
Foundry equipment index[k]	298.7	377.2	145.2	304.1†	153.3†
Gear sales index	273	292	128	275.5†	120.5†
Non-Ferrous Metals (U. S. only)					
Lead shipments[l]	69,382	59,169	46,563	231,829	171,967
Lead stocks[l]	34,018	42,899	63,463	.....	.....
Zinc shipments[m]	63,638	62,974	46,803	249,041	202,624
Zinc stocks[m]	8,305	7,311	78,396	.....	.....
Tin deliveries[n]	10,490	13,955	7,855	55,002	33,479
Refined copper deliveries[o]	141,801	123,580	68,665	490,457	287,684
Refined copper stocks[o]	95,568	97,761	169,120	.....	.....
Exports:					
Total iron and steel[p]	.....	515,657	612,906	2,208,161	2,531,708
All rolled and finished steel[p]	.....	273,897	270,330	1,128,633	1,208,344
Semi-finished steel[p]	.....	135,175	96,609	778,313	362,820
Scrap[p]	.....	120,152	221,152	293,968	850,253
Imports:					
Total iron and steel[p]	.....	1,526	6,674	3,051	26,784
Pig iron[p]	.....	0	286	0	4,815
All rolled and finished steel[p]	.....	1,336	2,322	2,796	8,379

Sources of data: [a] American Iron and Steel Institute; [b] THE IRON AGE; [c] Bureau of Mines; [d] Lake Superior Iron Ore Association; [e] Bureau of the Census; [f] American Institute of Steel Construction; [g] United States Steel Corp.; [h] Preliminary estimates by THE IRON AGE—Final figures from Bureau of the Census, U. S. only; [i] *Railway Age;* [j] National Machine Tool Builders Association; [k] Foundry Equipment Manufacturers Association; [l] American Bureau of Metal Statistics; [m] American Zinc Institute; [n] New York Commodity Exchange; [o] Copper Institute; [p] Department of Commerce; [r] Institute of Scrap Iron and Steel; [s] American Gear Manufacturers Association.

† Monthly averages.

The Iron Age Comparison of Prices

Advances Over Past Week in Heavy Type; Declines in Italics

	July 1, 1941	June 24, 1941	June 3, 1941	July 2, 1940
Flat Rolled Steel:				
(Cents Per Lb.)				
Hot rolled sheets	2.10	2.10	2.10	2.10
Cold rolled sheets	3.05	3.05	3.05	3.05
Galvanized sheets (24 ga.)	3.50	3.50	3.50	3.50
Hot rolled strip	2.10	2.10	2.10	2.10
Cold rolled strip	2.80	2.80	2.80	2.80
Plates	2.10	2.10	2.10	2.10
Tin and Terne Plate:				
(Dollars Per Base Box)				
Tin plate	$5.00	$5.00	$5.00	$5.00
Manufacturing ternes	4.30	4.30	4.30	4.30
Bars and Shapes:				
(Cents Per Lb.)				
Merchant bars	2.15	2.15	2.15	2.15
Cold finished bars	2.65	2.65	2.65	2.65
Alloy bars	2.70	2.70	2.70	2.70
Structural shapes	2.10	2.10	2.10	2.10
Wire and Wire Products:				
(Cents Per Lb.)				
Plain wire	2.60	2.60	2.60	2.60
Wire nails	2.55	2.55	2.55	2.55
Rails:				
(Dollars Per Gross Ton)				
Heavy rails	$40.00	$40.00	$40.00	$40.00
Light rails	40.00	40.00	40.00	40.00
Semi-Finished Steel:				
(Dollars Per Gross Ton)				
Rerolling billets	$34.00	$34.00	$34.00	$34.00
Sheet bars	34.00	34.00	34.00	34.00
Slabs	34.00	34.00	34.00	34.00
Forging billets	40.00	40.00	40.00	40.00
Wire Rods and Skelp:				
(Cents Per Lb.)				
Wire rods	2.00	2.00	2.00	2.00
Skelp (grvd)	1.90	1.90	1.90	1.90

The various basing points for finished and semi-finished steel are listed in the detailed price tables, pages 132-138 herein.
On export business there are frequent variations from the above prices. Also in domestic business, there is at times a range of prices on various products, as shown in our detailed price tables.

	July 1, 1941	June 24, 1941	June 3, 1941	July 2, 1940
Pig Iron:				
(Per Gross Ton)				
No. 2 fdy., Philadelphia	$25.84	$25.84	$25.84	$24.84
No. 2, Valley furnace	24.00	24.00	24.00	23.00
No. 2, Southern Cin'ti	24.06	24.06	24.06	23.06
No. 2, Birmingham	20.38	20.38	20.38	19.88
No. 2, foundry, Chicago†	24.00	24.00	24.00	23.00
Basic, del'd eastern Pa.	25.34	25.34	25.34	24.34
Basic, Valley furnace	23.50	23.50	23.50	22.50
Malleable, Chicago†	24.00	24.00	24.00	23.00
Malleable, Valley	24.00	24.00	24.00	23.00
L. S. charcoal, Chicago	31.34	31.34	31.34	30.34
Ferromanganese‡	120.00	120.00	120.00	120.00

†The switching charge for delivery to foundries in the Chicago district is 60c. per ton. ‡For carlots at seaboard.

Scrap:				
(Per Gross Ton)				
Heavy melt'g steel, P'gh.	$20.00	$20.00	$20.00	$19.75
Heavy melt'g steel, Phila.	18.75	18.75	18.75	19.50
Heavy melt'g steel, Ch'go	18.75	18.75	18.75	17.50
Carwheels, Chicago	....	....	....	19.00
Carwheels, Philadelphia	....	....	....	21.75
No. 1 cast, Pittsburgh	22.00	22.00	22.00	20.75
No. 1 cast, Philadelphia	24.00	24.00	24.00	21.75
No. 1 cast, Ch'go*	21.00	21.00	21.00	16.75

*Changed to gross ton basis.

Coke, Connellsville:				
(Per Net Ton at Oven)				
Furnace coke, prompt	$6.125	$6.125	$6.125	$4.00
Foundry coke, prompt	6.875	6.875	6.875	5.25
Non-Ferrous Metals:				
(Cents per Lb. to Large Buyers)				
Copper, electro., Conn.*	12.00	12.00	12.00	11.50
Copper, Lake, New York	12.00	12.00	12.00	11.50
Tin (Straits), New York	52.875	52.75	52.25	53.00
Zinc, East St. Louis	7.25	7.25	7.25	6.25
Lead, St. Louis	5.70	5.70	5.70	4.85
Antimony (Asiatic), N. Y.	16.50	16.50	16.50	16.50

*Mine producers only.

Composite Prices

	FINISHED STEEL	PIG IRON	SCRAP STEEL
July 1, 1941	2.261c. a Lb.	$23.61 a Gross Ton	$19.17 a Gross Ton
One week ago	2.261c. a Lb.	$23.61 a Gross Ton	$19.17 a Gross Ton
One month ago	2.261c. a Lb.	$23.61 a Gross Ton	$19.17 a Gross Ton
One year ago	2.261c. a Lb.	$22.61 a Gross Ton	$18.92 a Gross Ton

	High	Low	High	Low	High	Low
1941			$23.61, Mar. 20	$23.45, Jan. 2	$22.00, Jan. 7	$19.17, Apr. 10
1940	2.261c., Jan. 2	2.211c., Apr. 16	23.45, Dec. 23	22.61, Jan. 2	21.83, Dec. 30	16.04, Apr. 9
1939	2.286c., Jan. 3	2.236c., May 16	22.61, Sept. 19	20.61, Sept. 12	22.50, Oct. 3	14.08, May 16
1938	2.512c., May 17	2.211c., Oct. 18	23.25, June 21	19.61, July 6	15.00, Nov. 22	11.00, June 7
1937	2.512c., Mar. 9	2.249c., Jan. 4	23.25, Mar. 9	20.25, Feb. 16	21.92, Mar. 30	12.92, Nov. 10
1936	2.249c., Dec. 28	2.016c., Mar. 10	19.74, Nov. 24	18.73, Aug. 11	17.75, Dec. 21	12.67, June 9
1935	2.062c., Oct. 1	2.056c., Jan. 8	18.84, Nov. 5	17.83, May 14	13.42, Dec. 10	10.33, Apr. 29
1934	2.118c., Apr. 24	1.945c., Jan. 2	17.90, May 1	16.90, Jan. 27	13.00, Mar. 13	9.50, Sept. 25
1933	1.953c., Oct. 3	1.792c., May 2	16.90, Dec. 5	13.56, Jan. 3	12.25, Aug. 8	6.75, Jan. 3
1932	1.915c., Sept. 6	1.870c., Mar. 15	14.81, Jan. 5	13.56, Dec. 6	8.50, Jan. 12	6.43, July 5
1931	1.981c., Jan. 13	1.883c., Dec. 29	15.90, Jan. 6	14.79, Dec. 15	11.33, Jan. 6	8.50, Dec. 29
1930	2.192c., Jan. 7	1.962c., Dec. 9	18.21, Jan. 7	15.90, Dec. 16	15.00, Feb. 18	11.25, Dec. 9
1929	2.236c., May 28	2.192c., Oct. 29	18.71, May 14	18.21, Dec. 17	17.58, Jan. 29	14.08, Dec. 3

Based on steel bars, beams, tank plates, wire, rails, black pipe, sheets and hot-rolled strip. These products represent 85 per cent of the United States output.

Based on averages for basic iron at Valley furnaces and foundry iron at Chicago, Philadelphia, Buffalo, Valley and Southern iron at Cincinnati.

Based on No. 1 heavy melting steel scrap quotations to consumers at Pittsburgh, Philadelphia and Chicago.

Summary of the Week

• Defense needs keep July 4th ingot output drop to seven points in smallest holiday decline in years . . . Threats of a pig iron shortage grow, as OPACS sets maximum prices . . . Mills tighten on commercial steel shipments.

EUROPE'S spreading war and its growing threat to American security this week will hamper observance of the July 4th holiday in many steel plants and steel ingot production for the week will decline only seven points to 93.5 per cent, in one of the narrowest holiday drops in the steel industry's history. Last year's Independence Day saw ingot production slump 13 points to 75 per cent of rated capacity. Finishing departments in most steel producing centers will shut down for the holiday, however, giving raw steel departments that small opportunity to catch up.

How urgent the need for steel to meet defense needs of the United States and Britain is becoming is emphasized in a statement by a Chicago mill that it can no longer ship flat-rolled products which are not for defense use, in a meeting of automobile manufacturers and OPM officials called for Wednesday at Washington in connection with a further slash in automobile production, in indications that some plants shortly may close for lack of pig iron, and in signs that, after 12 weeks of Government control of iron and steel scrap markets the steel industry does not have an orderly flow of scrap to its furnaces.

On June 25 the Office of Price Administration and Civilian Supply, as forecast, established maximum prices for the sale of pig iron, a step which may be followed by Government-directed shipments and which has disrupted some trade relationships where part or full freight rate absorption was involved. The pig iron situation is reaching a near-crisis stage. So far there have been no allocations of pig iron, although plants with large defense orders are receiving no assurance as to where their supplies will come from when the small iron inventories on hand are used up. The shortage extends to manufacturing plants and also some non-integrated steel mills.

HIGHLIGHTING the growing pressure on civilian steel consumers to find enough steel and some other materials to maintain anything like normal operating schedules, is the effort to curtail automobile production. Automobile manufacturers, singled out because of the size of their industry, its great consumption of vital materials and its added importance after conversion into a defense industry, insist that the industry's planners and schedule makers have only one interest, and that is an orderly transition from automobile output to full defense production.

Already orders for automobile manufacturers and other requirements classed as "non-defense" are being set back and curtailment in civilian steel shipments far beyond anything imagined a short time ago is predicted at steel centers as the percentage of new bookings carrying preference ratings increases. Some mills estimate that as high as 60 per cent of the new orders are linked directly or indirectly to defense needs. With mills tightening up on commercial shipments, the outlook for complete fulfillment of such commitments appears obscure.

LATEST developments in the dispute over adequacy of steel capacity to meet defense needs are estimates by Republic Steel Corp. that by the close of 1941 ingot capacity in the United States will be 91 million tons yearly, against estimated U. S. and British defense requirements of 23 million tons, and a report issued by the House military affairs subcommittee that neglect in increasing steel producing facilities has developed principally because we could not or would not give definite assurance to industry as to what it might expect from a wartime expansion of its plants. The Defense Plant Corp. is expected quickly to agree to finance Carnegie-Illinois Steel Corp.'s $85 million expansion plan at the Homestead and Duquesne, Pa., plants, for which details were announced this week.

Meanwhile an increase of 16.5 per cent in carloadings of iron and steel in the third quarter of 1941 over the corresponding period last year is forecast by the Shippers' Advisory Boards, with steel traffic of 566,743 cars in the current quarter compared to 486,382 cars in the 1940 third quarter.

The week's rail purchases include 2300 freight cars, 55 passenger cars, and 64,000 tons of rails. Structural steel awards advanced to 34,000 tons from 27,000 tons last week, the outstanding letting being 46,500 tons for an ordnance plant at St. Louis. Reinforcing steel awards totaled 10,425 tons, while new projects jumped to 20,900 tons from 11,625 last week.

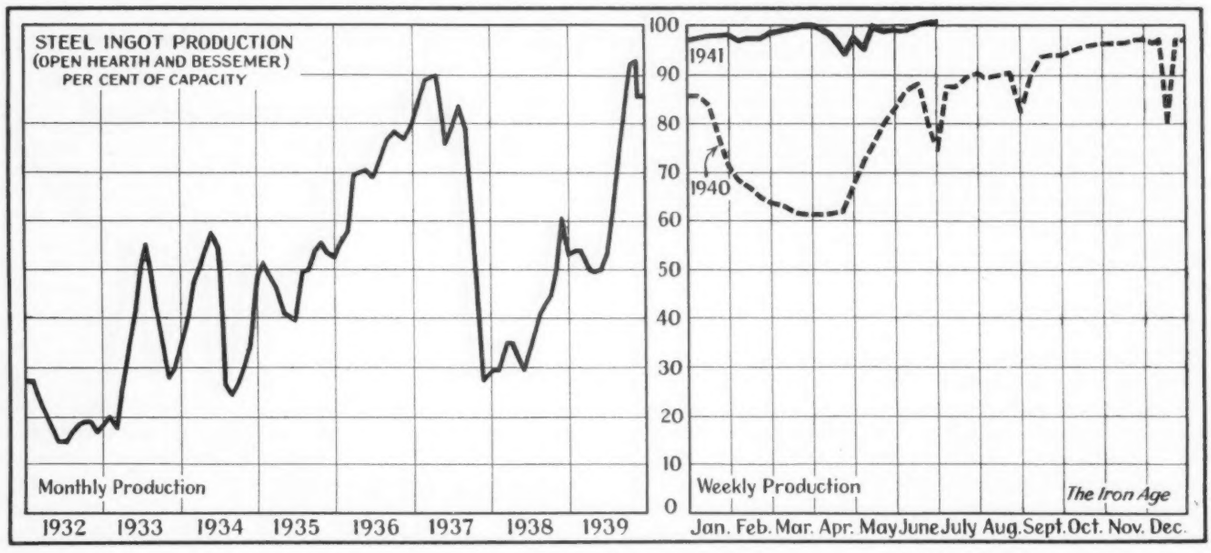
The Industrial Pace . . .

With all components except the automobile series showing moderate gains, THE IRON AGE index of capital goods activity last week extended the rising trend of the recent weeks by advancing 1.2 points to 119.6. The decline in physical volume of automobile output last week, the first major decrease since the April strike, was slightly greater than seasonal, causing a loss of three points in the adjusted index for this series.

Heavy construction continues to be the strongest factor in the index. Building awards this week amount to $143,520,000, the fourth consecutive week in which awards have exceeded the $100,000,000-mark. Ordnance facilities, defense plants and other public work account for 90 per cent of the past week's volume.

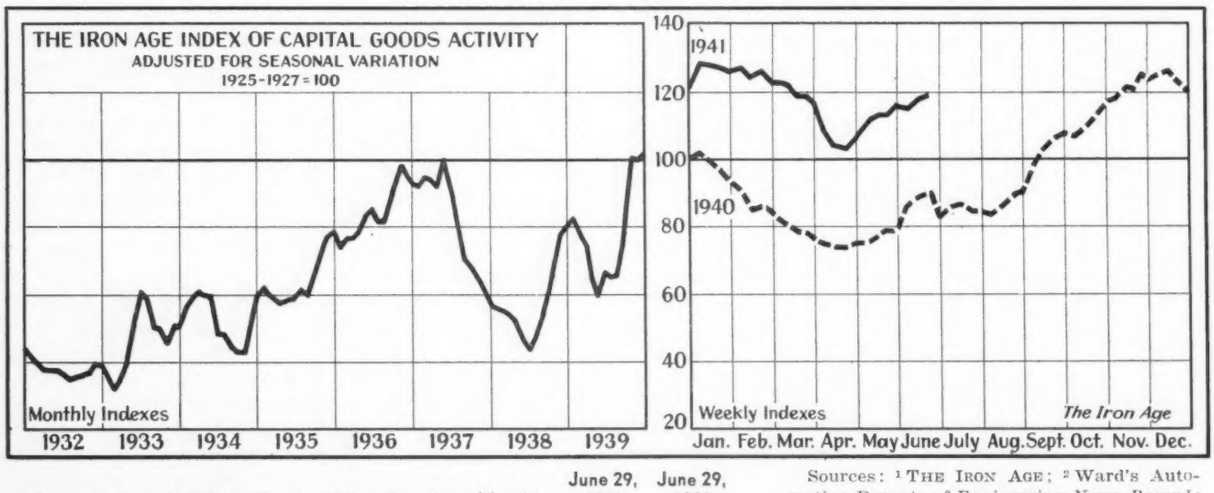
Counter-seasonal gains in production activities in many lines have acted to accelerate the upward movement of the index. According to present indications, this will be a factor for some time to come. Supporting the strength shown in the capital goods index, the volume of manufacturers' new orders continue to rise (see accompanying graph).

Holiday Lowers Ingot Rate to 93.5%


STEEL INGOT PRODUCTION
(OPEN HEARTH AND BESSEMER)
PER CENT OF CAPACITY
Monthly Production
1932 1933 1934 1935 1936 1937 1938 1939
1941
1940
Weekly Production
The Iron Age
Jan. Feb. Mar. Apr. May June July Aug. Sept. Oct. Nov. Dec.
100 90 80 70 60 50 40 30 20 10 0

District Ingot Production, Per Cent of Capacity	Pitts-burgh	Chicago	Valleys	Phila-delphia	Cleve-land	Buffalo	Wheel-ing	Detroit	Southern	S. Ohio River	West-ern	St. Louis	East-ern	Aggre-gate
Current Week ..	98.0	93.0	89.0	93.0	93.0	100.0	86.0	89.5	90.0	98.5	95.0	103.0	87.0	93.5
Previous Week..	100.0	103.5	100.0	97.5	97.0	104.5	90.0	105.5	95.0	106.0	102.5	111.0	97.0	100.5

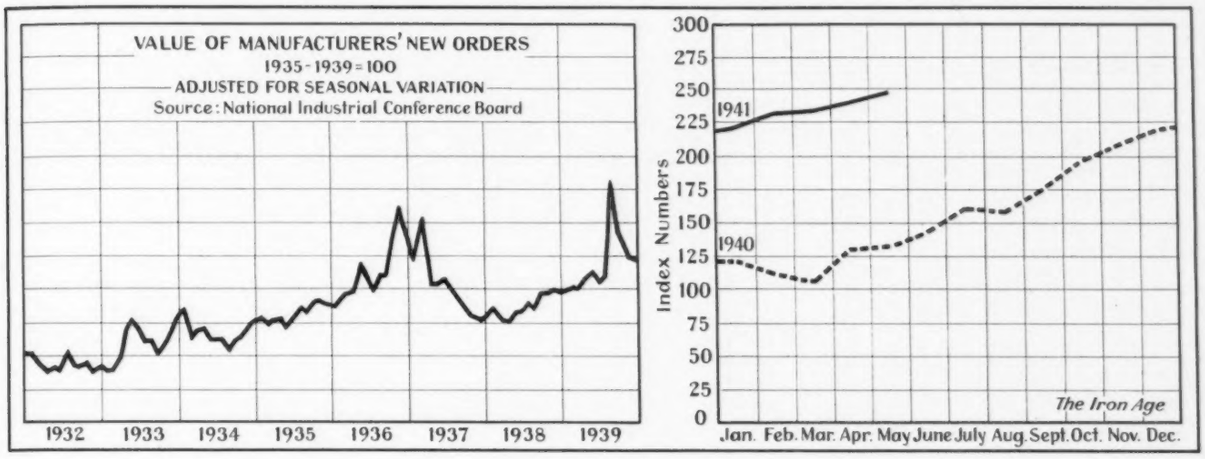
Index Continues Upward Trend


THE IRON AGE INDEX OF CAPITAL GOODS ACTIVITY
ADJUSTED FOR SEASONAL VARIATION
1925-1927 = 100
Monthly Indexes
1932 1933 1934 1935 1936 1937 1938 1939
1941
1940
Weekly Indexes
The Iron Age
Jan. Feb. Mar. Apr. May June July Aug. Sept. Oct. Nov. Dec.
140 120 100 80 60 40 20

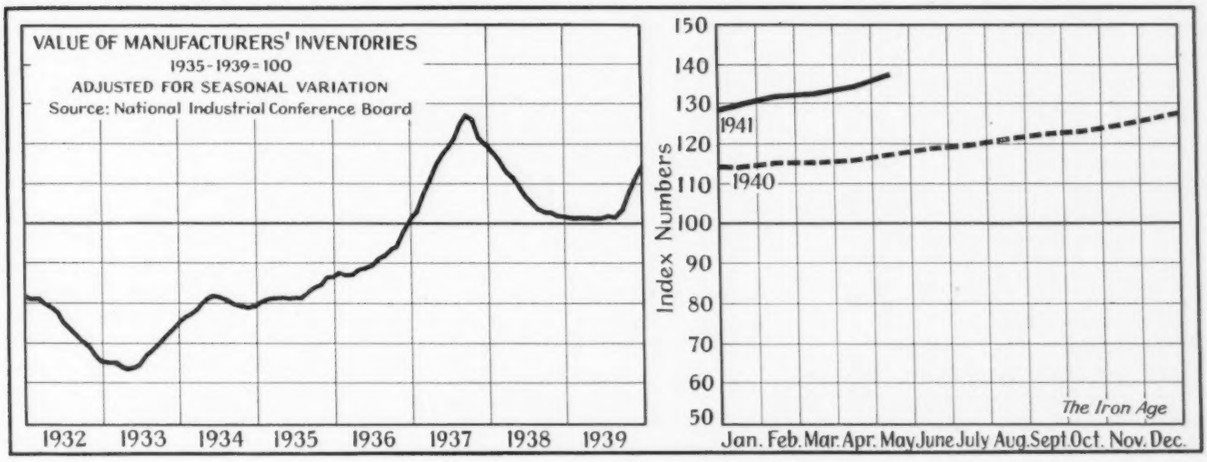
▼Component Week Ended➤	June 28	June 21	May 31	June 29, 1940	June 29, 1929
Steel ingot production[1]	147.5	145.3	136.8	132.2	137.0
Automobile production[2]	118.8	121.8	115.5	81.3	135.6
Construction contracts[3]	120.4	118.9	109.2	69.2	121.8
Forest products carloadings[4]	79.9	75.9	77.4	61.7	120.7
Pittsburgh output and shipments[5]	131.6	130.1	131.4	105.4	129.9
COMBINED INDEX	119.6	118.4	112.9	90.0	129.9

Sources: [1] THE IRON AGE; [2] Ward's Automotive Reports; [3] *Engineering News-Record;* [4] Association of American Railroads; [5] University of Pittsburgh. Indexes of forest products carloadings and activity in Pittsburgh area reflect conditions as of week ended June 21. Other indexes cover week of June 28.

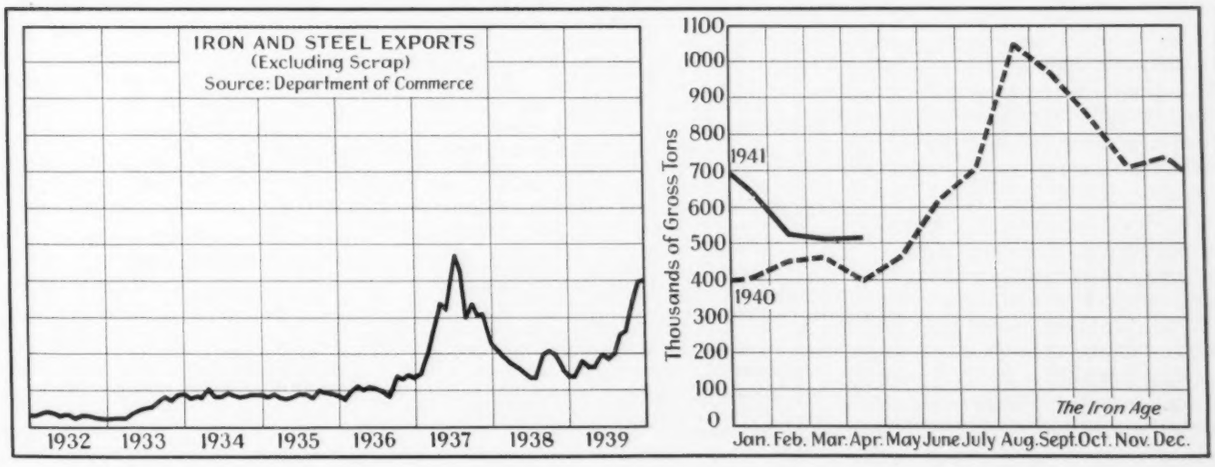
Manufacturers' Orders 90% Over Year Ago


VALUE OF MANUFACTURERS' NEW ORDERS
1935-1939=100
ADJUSTED FOR SEASONAL VARIATION
Source: National Industrial Conference Board
1932 1933 1934 1935 1936 1937 1938 1939
Index Numbers
300 275 250 225 200 175 150 125 100 75 50 25 0
1941
1940
The Iron Age
Jan. Feb. Mar. Apr. May June July Aug. Sept. Oct. Nov. Dec.

Inventories Gain 2.4% to New Peak


VALUE OF MANUFACTURERS' INVENTORIES
1935-1939=100
ADJUSTED FOR SEASONAL VARIATION
Source: National Industrial Conference Board
1932 1933 1934 1935 1936 1937 1938 1939
Index Numbers
150 140 130 120 110 100 90 80 70 60 50
1941
1940
The Iron Age
Jan. Feb. Mar. Apr. May June July Aug. Sept. Oct. Nov. Dec.

Iron and Steel Exports Rise Moderately


IRON AND STEEL EXPORTS
(Excluding Scrap)
Source: Department of Commerce
1932 1933 1934 1935 1936 1937 1938 1939
Thousands of Gross Tons
1100 1000 900 800 700 600 500 400 300 200 100 0
1941
1940
The Iron Age
Jan. Feb. Mar. Apr. May June July Aug. Sept. Oct. Nov. Dec.

Market News

. . . THE WEEK'S ACTIVITIES IN IRON AND STEEL

New Business

. . . More than half new orders are linked to defense

Further curtailment in civilian steel shipments is forecast at PITTSBURGH as the percentage of new bookings carrying preference ratings increases. Already some mills estimate that from 50 to 60 per cent of fresh orders are in some way sponsored by National Defense needs. Of the substantial backlog of steel business which, with some mills, runs from four to six months production, a large portion is also for national defense purposes. With steel mills tightening up on commercial shipments, the future for complete fulfillment of such commitments is somewhat obscure. PITTSBURGH also reports the pig iron situation nearing a crisis which will have to be solved by either allocation or priorities. Some pig iron users already have had to shut down and others with defense orders are rapidly depleting inventories with little or no assurance that future supplies will be forthcoming.

The steady growth of defense business is forcing steel mills at CLEVELAND and YOUNGSTOWN to keep rolling schedules highly flexible. During the past week, for example, several assorted tonnages for shipment before July 15 were received, necessitating an immediate start on rolling and the sidetracking of less vital business. The Navy in particular has been buying briskly recently.

The freezing of pig iron prices by the government has disrupted some trade relationships where partial or full freight absorption was involved. The price move is regarded as a prelude to directed shipments.

On steel shipments, producers will now find it easier to quote on far-away requirements of the government. A few days after OPACS at Washington permitted price quoting alternatives for steel producers, instances were found at CLEVELAND where consumers operating on defense business had agreed to pay freight from other basing points, but large producers expressed doubt that the practice ever would become widespread in connection with their regular trade.

New buying was considerably smaller in the last week in the CHICAGO district. Priority orders continue on the uptrend but non defense business is decidedly off, probably for the reason that deliveries cannot be made this year and no promises of any kind can be made for the early part of 1942. Inquiries and orders for piling were off sharply. Concrete bar business is heavy with a shortage felt. Chicago steel producers are losing considerable time by the necessity of changing rolls.

With steel becoming continually scarcer for civilian use, practice among EASTERN PENNSYLVANIA has been to allot the production over that necessary for priority and national defense work to customers on civilian work, basing the customer's allotment on previous tonnages booked. However, in many cases priority orders come in and supersede these orders, necessitating a reduction of the scheduled tonnage for custowers.

While the prospects for new business in the ST. LOUIS area are still on the increase, actual commitments are on the decrease because of the difficulty in placing any orders except those having priorities.

Bookings at BIRMINGHAM for the first half of 1941 are estimated to have exceeded bookings for the entire year of 1940 by from 10 to 12 per cent. As orders exceed production by a wide margin, promises on inquiries are becoming still further deferred.

Private inquiries have shown a marked decline on the West Coast. Widely separated Pacific Coast fabricators and mills report nearly all new inquiries are for defense construction. This situation has succeeded one in which there were numerous provisional inquiries probing price and delivery possibilities. Negotiations are under way for reduction of rail rates for shipment of steel to the Pacific Coast.

Producers in EASTERN PENNSYLVANIA area are continuing business at much the same stand as they have for the past several months, awaiting effects of the recent price stabilization. Small lots of iron are moving as rapidly as possible, to as many customers as can be supplied. Only two consumers, one steel mill one foundry, have found it necessary to appeal to the OPM for aid in getting iron.

New orders at BUFFALO remain at just about the same level as in previous weeks, but approximately 90 per cent of all new business accepted today is for use in defense work and bears priority earmarks. As result of receipt of tremendous tonnages of priority orders in the last few weeks deliveries have been constantly lengthening in practically every classification to the point where, according to an executive of one of this area's largest mills, "schedules are becoming so confused we're not making any promises to anyone anymore." Probability that books may be opened for 1942 a good deal earlier this year than usual is foreseen by some sales executives here.

C-I Buys Standard Tin Plate Company

Pittsburgh

• • • Standard Tin Plate Co., Canonsburg, Pa., a subsidiary of Continental Can Co., was purchased this week by Carnegie-Illinois Steel Corp., and as of July 1, about 2000 Standard Tin Plate and Canonsburg Coal Co. employees become employees of Carnegie-Illinois.

Standard Tin Plate has been producing hot reduced tin plate at virtual capacity in recent months, the plant's rated capacity being slightly more than 140,000 tons annually.

Carnegie-Illinois, which has furnished sheet bars to Standard Tin Plate for some time, is expected to use at least part of the output of the acquired hot mills in augmenting tonnage now being made for the British. It is assumed that the largest proportion of tin plate formerly made at Standard for its parent company, Continental Can, will now be supplied by Carnegie-Illinois.

Pig Iron

. . . Government control of shipments seen as next step

Pig iron shipments directed by the government will be the next logical step following the government price freezing order, CLEVELAND reports. Some consumers will be forced to turn to local furnaces after years of accepting iron from outside the districts. On top of higher iron ore, coke and wage costs, iron producers are unwilling to absorb much freight. On export tonnage, sellers will be able to quote f.o.b. basing point at or nearest the place of production. It is believed the exceptions granted the Sharpsville and Struthers furnaces will apply to outside producers shipping to the territory served by those two.

See Page 112 for details of OPACS pig iron price ceiling order.

No great hurry to make new pig iron contracts is reported in the SOUTHERN OHIO district, following the government fixation of prices. While the new prices by and large have not changed the Southern Ohio picture, furnace representatives are still uncertain as to exactly what the quotation should be for iron shipped into this area from other markets. Hamilton is definitely out of the market, and with no pig iron being produced, consumers must seek their material in other areas. The present trend, however, is to offer the iron at a price f.o.b. the nearest basing point of the producer, plus the freight from there to Cincinnati. Although there is some feeling that it should be quoted on the Hamilton base plus the freight from the producer point. Foundry production is still at virtual capacity, so far all casting producers have been able to obtain sufficient material to keep in operation, although the feeling still obtains that the "finger crossing" time is not far distant.

Priority orders for direct defense requirements are taking increasing tonnages from BIRMINGHAM furnaces.

Ceiling prices on pig iron mean just one thing—a whale of a lot of extra work for furnaces and a further befuddling of the whole situation. Everybody is yelling for iron and furnaces are endeavoring to keep plants running by making deliveries of at least part of requirements. Foundries in general are going full, six days a week.

The fixing of maximum prices on pig iron by the government has had no effect so far on the situation in ST. LOUIS. The prices established have been in effect for several months. Shipments continue as heavy as production permits, with care being exercised to see that tonnages are allocated where they are most needed and to prevent accumulation of piles.

Construction work has been started on the new blast furnace (No. 6) at the Lackawanna plant of the Bethlehem Steel Co. It is hoped to have the new stack completed and producing iron before Dec. 1.

OPACS Says Price Ceilings Are Evaded

Washington

• • • Evasions of ceiling prices, especially in the scrap and secondary aluminum and zinc industry, by a few individuals was charged early this week by Leon Henderson, administrator of the Office of Price Administration and Civilian Supply. Among the subterfuges and devices which the OPACS chief said were being employed to evade the ceilings were falsification of records and failure to list all transactions and payment of "premiums" or "service charges" to dealers and listing dealers as "agents" and "employes" and making them entitled to "commissions" or a "salary."

Other methods were said to be unwarranted interpretations of freight clauses in the price orders, selling of dirty and mixed scrap at prices set for clean and uncontaminated material and too liberal interpretation of grade specifications.

Plates

. . . Movement begins to shipyard at New Orleans

Cleveland reports shipments have already started to the Delta shipyard at New Orleans, which is being operated by American Shipbuilding Co., Cleveland, and which eventually will embrace upwards of 25 ways.

Efforts are being made to get priority ratings for steel for pipe making lines recently reported placed. CHICAGO mills have been shipping against these orders for some time. Railroads anticipate that their carloadings in the final half of the year will be approximately 15 per cent higher.

Bolts, Nuts and Rivets

. . . Railroad, car builders press for earlier deliveries

Aircraft, army tank, Navy work and gun mount requirements are heavier at CLEVELAND among other defense orders. Railroads and car builders, now holding preference ratings, are pressing for shipments. All these "must" orders, with the situation on raw materials such as bars and rods, tend toward delayed deliveries for ordinary peace-time buyers, even though producers are anxious to serve them as quickly as ever.

Action on 5000 tons of steel involved in about eight million bolts and nuts for shell packing cases has been delayed. Bids were taken on June 27. The names of the low bidders were not given out and it was said that announcement of the final distribution would be made in a few days. Bolt and nut manufacturers are operating at a slower pace due to the difficulty in getting steel.

Warehouse Business

. . . Hot rolled bars in heaviest demand at Cleveland

At Cleveland heaviest demand centers on hot rolled bars, all plates except floor plates, and upon 10 to 16 gage heavy annealed sheets. Stocks of these items are at a low point. The availability of various alloy steels and coated sheets seems to vary depending on the class of trade catered to by different warehouses and the degree of leniency in size of orders accepted. Some jobbers are hard pressed to meet demands.

Warehouses at BIRMINGHAM are finding it virtually impossible to replenish exhausted stocks. Mills there have reportedly declined to take additional warehouse orders unless the orders are accompanied by a high priority rating which the warehouses are seldom able to furnish.

Ingot Operations

. . . Many open hearths will operate on July 4th—rate off only 7 points

Contrary to past practice many open hearths are working this week through the Fourth of July holiday in order to avoid losses of much needed material. Therefore, ingot production as computed by THE IRON AGE is reduced by only seven points from last week to 93.5 per cent, while last year a loss of 13 points was recorded when the rate dropped from 88 to 75 per cent. Estimated ingot rate district losses vary greatly: At Pittsburgh a drop of only two points was foreseen, but the Chicago and Valley areas will lose about 11 per cent of their rate and at Detroit, where both Ford and Great Lakes are vacationing, 16 points will be dropped.

Tubular Goods

. . . Week sees extension of pipe deliveries

Tubular order books are rapidly filling up at PITTSBURGH and deliveries are becoming further extended on various products each week. A much greater volume of orders now on the books is slated for National Defense purposes than is generally supposed. Many milis are in no position to quote on civilian line pipe business with the result that many of these inquiries are finding no takers.

Inquiries continue exceptionally heavy and diversified at YOUNGSTOWN and CLEVELAND, consumers hoping to get on mill books before the government breaks out with some of the big pipelines which are on the boards. Lacking priorities, much of the tonnage booked recently may be delayed in shipment if the big "must" projects materialize soon.

New bookings in PHILADELPHIA are being accepted from jobbers and warehouses for merchant pipe, which to a great extent will go into Federal Housing projects, naval construction and other defense uses. However, delivery dates are being moved back further each day, and pipe orders for civilian use are being refused.

Large tonnages are being turned down by CHICAGO pipe manufacturers as the business cannot be handled. June shipments were close to record levels with some producers. It is doubtful if the tonnage delivered will equal that of May for the reason that there were fewer shipping days. Extremely warm weather was another deterring factor in June.

Sheets and Strip

. . . Consumer absorbs freight on Cleveland order

While the practice is not expected to become widespread, due to producers' desire for retaining established trade relationships, late last week at CLEVELAND around 70 tons of strip for defense production were sold with the consumer absorbing freight from western Pennsylvania. Demand for heavy gage hot rolled sheets, silicon sheets and coated stock continues intense at CLEVELAND.

Further curtailment in automotive deliveries has materialized and PITTSBURGH makers, because of National Defense needs, find it necessary to give extremely indefinite promises on new orders from strictly commercial users. It is also pointed out that the amount of raw steel available to sheet mills continues to depend upon the distribution of available supplies on an equitable basis, assuming National Defense needs will be supplied first.

Producers in CHICAGO are constantly taking orders for defense and as a result auto manufacturers and others classed as non defense are being set forward. One large Middle Western mill announces that no orders are being taken that are not strictly for preparedness.

Announcement of government prices on sheet steel is accepted by the SOUTHERN OHIO sheet producers as being a good rule and one that is likely to take care of the obvious unfairnesses in some quotations. New business has continued to follow the picture that has obtained for the past several weeks, with an ever increasing amount of government defense bookings. While normal sheet users are feeling some effects from the curtailment of their supply, it is felt that this has not reached serious proportions yet. In fact, it is felt that they are receiving sufficient material to maintain operations at least at the 1940 level, but will probably feel the pinch insofar as they are unable to take advantage of the present natural increase of consumer demand. Fourth quarter bookings are still being held up until some idea of rolling schedules is fixed.

Iron Ore Shipments Set Record in June

Cleveland

• • • Vessel shipments of Lake Superior iron ore from Upper Lake Ports during June totaled 10,789,574 gross tons, a new peak for the month, according to the latest report of the Lake Superior Iron Ore Association, Cleveland. In May, shipments totaled 11,081,199 tons.

Wire Products

. . . Holiday reduces operations in some areas

Rush orders for the defense program continue to tax mill schedules at CLEVELAND. Several large orders came through last week and in one case production started before receipt of the formal order because of the July 15 delivery date. The OPACS revision makes it easier for producers to quote on Gulf and seaboard requirements of the government.

With the Newburgh Works on vacation this week and the holiday scheduled to be observed, wire drawing operations at CLEVELAND were reduced temporarily.

With orders continuing ahead of production and with National Defense needs expanding each week PITTSBURGH observers foresee additional civilian curtailments from here on. Wire departments are also controlled to some extent by the amount of steel they are being allocated.

Demand is reported light in the St. Louis territory as jobbers are interested only in clearing their stocks, with the expectation of buying again in the fall as supplies are needed.

Merchant Bars

. . . Preferential ratings push back civilian shipments

Pittsburgh finds civilian deliveries being pushed further back as the volume of orders with preferential ratings continues to expand substantially. Despite the need for steel shell forgings one large plant with ample facilities for making such forgings is unable as yet to obtain government contracts. Bar makers are clamping down on past "liberalizations" in chemical specifications and consumers are to be charged in strict conformance with actual lists.

Semi-Finished Steel

. . . Distribution of supplies remains a big problem

The urgent need for semi-finished material has caused most steel companies to set up schedules carrying operations through the Fourth of July holiday. Distribution of available semi-finished supplies continues one of the toughest problems in the steel industry's history.

Railroad Buying

. . . Week's orders: 2300 freight cars, 64,000 tons of rails

This week's purchases include 2300 freight cars, 64,000 tons of rails and 55 passenger cars.

The following rail orders were placed: Chesapeake & Ohio 20,162 tons with Carnegie-Illinois Steel Corp., Inland Steel Co. 14,075 and Bethlehem Steel Co. 3804; Pere Marquette 2475 tons with Carnegie-Illinois, Inland 2200, Bethlehem 825 and Algona Steel Corp., Canada 2500; New York, Chicago & St. Louis 7150 tons with Carnegie-Illinois, Inland 1980 and Bethlehem 1870; Reading 7000 tons with Bethlehem. The Nickel Plate is reported to have placed 1000 box cars with General American Transportation Corp. and Reading 500 gondolas with Bethlehem.

Among other recent freight car purchases were: Cambria & Indiana 400 hoppers from Bethlehem; St. Louis-Southwestern 500 freight cars from own shops; Rock Island 200 gondolas, American Car & Foundry Co.; Litchfield & Madison 50 hoppers, General American Transportation. Norfolk & Western 25 gondolas from Ralston Steel Car Co.; Akron, Canton & Youngstown 100 hoppers and 30 gondolas from Bethlehem.

The following passenger car orders were placed: Santa Fe bought 37 cars from Edward G. Budd Mfg. Co.; Pennsylvania bought 12 and Florida East Coast six cars from the same maker. This road also placed three 2,000-hp. diesel-electric units with Electro-Motive Corp., New York. Susquehanna ordered two 1,000-hp. diesel-electric engines from Electro-Motive Corp. Union Pacific bought 2,500 steel freight car underframes from the Mount Vernon Steel Car Co.

These inquiries were reported: The Argentine State Railroad 375 box cars, United States Army 12 rail motorcars and two trailers. Wabash Railway was authorized by Federal Court to buy 10,000 tons of rails with accessories, and supplies to build 100 freight cars.

Export Trade

. . . How OPACS established pig iron prices

Maximum export prices for pig iron have been established by OPACS as follows: basing point price, plus differentials for analysis and transportation charges from the governing basing point to place of export as customarily computed. In the case of exports, the governing basing point may be the established basing point at or nearest the place of production.

Reinforcing Bars

. . . Pending projects rise to 20,900 tons from 11,625 tons last week

Reinforcing steel awards total 10,425 tons and include 2000 tons for a storehouse at the Philadelphia Navy Yard; 1750 tons for a warehouse at the Watertown Arsenal, Watertown, Mass., and 1700 tons for relocation of the Santa Fe tracks at Durand, Okla.

Reinforcing steel pending projects jumped to 20,900 tons from 11,625 tons last week. Outstanding new jobs are 10,000 tons for an army base at Jamaica, British West Indies; 6300 tons for naval defense construction on the Pacific islands; 1500 tons for an additional depot and other requirements at the naval supply depot, Bayonne, N. J., and 1200 tons for a quay wall at the Norfolk navy yard.

Structural Steel

. . . Awards gain to 34,000 tons from 27,500 tons a week ago

Fabricated structural steel awards this week advanced to 34,000 tons from 27,500 tons last week. Outstanding lettings were 16,500 tons for an ordnance plant at St. Louis; 2150 tons for an ordnance plant and 14 warehouses at Savanna, Ill.; 1080 tons at Columbus, Ohio, for nine sheds for the army, and 1700 tons for a foundry at the Brooklyn Navy Yard.

Structural steel projects declined to 15,575 tons. The largest inquiries reported include 3000 tons for hangars at Lakehurst, N. J.; 2000 tons for a boiler house at the Brooklyn Navy Yard; 1600 tons for 13 warehouses for the army at Ogden, Utah, and 1100 tons at Lenoir City, Tenn., for radial gates for the TVA.

NLRB Orders Weirton Union Disestablished

Washington

• • • **Weirton Steel Co.** was ordered by the NLRB last week to cease discouraging membership in the SWOC at plants in Weirton and Clarksburg, W. Va., and Steubenville, Ohio. The board also directed the company to disestablish the Weirton Steel Employees Representation Plan, and the Weirton Steel Employees Security League and five subdivisions. Out of alleged discriminations against 100 employees, the labor board dismissed 83 of the charges, ordered the company to reinstate with back pay the remaining 17 employees.

Lamson Cuts Vacations

Cleveland

• • • **Lower-salaried employees** of Lamson & Sessions Co. here, who have had two weeks' summer vacation previously, this year will work one week with extra pay and take only one week off.

Machine Tools

. . . SALES, INQUIRIES AND MARKET NEWS

New Production Records

Cleveland

• • • **Output of principal producers** in this city reached a new high level in June. National Acme turned out 135 automatics, a new peak. Warner & Swasey produced around 400 turret lathes. The latter company last week leased about 91,000 sq.ft. of additional floor space, some of which probably will be used for machining beds of small machines while part of the remaining new floor space will be used for storage of parts now being supplied by sub-contractors and some may be used for assembly. Production for the first six months of 1941 by Monarch Machine Tool Co. was 126 per cent over that of the same period last year.

Unquestionably a pick-up in orders is coming but contracts for some of the big government-financed projects have been delayed. Late last Friday at Cleveland it was reported one big bomber award had been granted an eastern plane maker. During June new business booked by one of the leading producers here was estimated to be roughly equal to two-thirds of a month's production against three-fourths of a month's production in May.

Lees-Bradner Co. has been allocated $281,500 for machinery and equipment by the Defense Plant Corp.

Material Shortages Threaten

Cincinnati

• • • **While no serious bottlenecks** have as yet appeared, local machinery men indicate that the problem of obtaining needed material is becoming increasingly difficult. In fact, in some instances the needed material arrived just about at the moment when it was needed for completion of the tool. Some plants have resorted to airplane shipments in order to obtain needed items, and many of the companies have hired men for the sole purpose of scouting around to find all available avenues of supply to keep a steady flow of needed material.

The general feeling seems to be, that at the present production rate and its gradual increase, the total output for the industry this year will be close to, if not in excess of, $800,000,000.

Lend-Lease Buying Slow

New York

• • • **Extremely complicated procedure** is holding up purchases of machinery for Great Britain under the Lend-Lease Act. Practically no machines have been purchased by the United States Government under this plan and in the meantime, independent ordering by the British Purchasing Commission has ceased. China is buying some machine tools here in New York with funds provided by the Export-Import Bank. The Russians have a few inquiries out and are angling for permits. Japanese buying has come to a standstill, since all permits are lacking for machine tool exports.

In the immediate local area, new business has declined in the past few weeks, but in the Eastern area as a whole the volume of orders continues to exceed current shipments. There has been some heavy arsenal buying, and aircraft companies in Buffalo have released large orders in the last week. On the other hand, as far as the aircraft engine builders are concerned, they are still asking for quotations on specific production jobs, but the big splurge in connection with the 500-bomber-a-month program is yet to appear.

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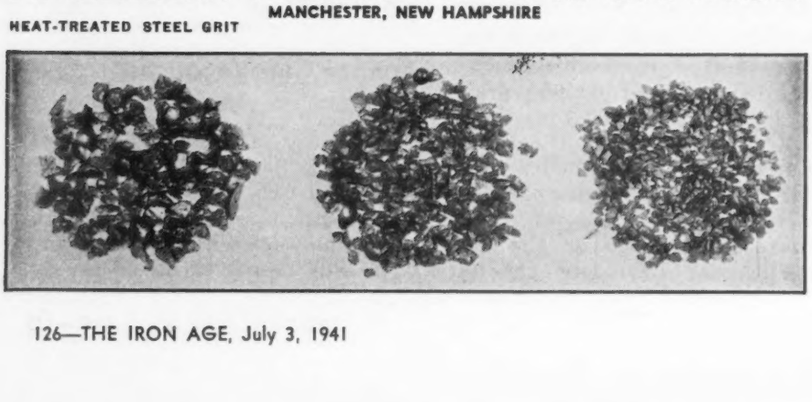

Non-Ferrous Metals

. . . MARKET ACTIVITIES AND PRICE TRENDS

New York, July 1—Outstanding development in the non-ferrous market this week was the revision of the General Preference Order No. M-11 by OPM relating to the distribution of zinc. Summarized, these revisions are: Although a producer must set aside a specified amount for the zinc pool, he may make full deliveries of minimum quantities so long as these deliveries do not interfere with defense orders. Minimum quantities in the case of slab zinc are minimum carload lots, and for zinc oxide and zinc dust are 2000 lb.

Customers must file affidavits with suppliers, stating that customers' inventories are not being increased unnecessarily, and producers must file affidavits with the OPM stating their intention to report to the Priorities Division non-observance of the order on the part of customers. Marketwise, the zinc situation has not changed. It is becoming increasingly difficult to obtain adequate supplies for non-defense use. Prices remain unchanged at 7.25c. East St. Louis, and 6.65c. a lb., New York.

Copper

Strong indications last week of ceiling prices being close at hand for brass ingots and scrap materials, as well as one-price market for all first-hand copper, apparently has met with opposition, influencing OPM to give further consideration to the matter, and temporarily postponing any action. In respect to obtaining supplies of brass scrap, almost nothing is available at the best prices consumers can offer, and it is reported that one manufacturer has requested that OPM place brass ingots and scrap under complete priority, hoping to bring about improvements in the ingot maker's intake. Prices held unchanged, with producers quoting 12c. a lb., Connecticut Valley, and smelters 12.50c. Bonded copper was quiet on the whole, although it is believed that there were some orders for small amounts at 11c., f.a.s., New York.

Tin

American deliveries of tin during June totaled 14,880 tons, the largest on record with the exception of March, when shipments were 16,092 tons. After a week or more of moderate buying, the market was idle at the close of the past week, with prices holding steady a shade under 53c.

Lead

Chief interest in the lead market continues to center on the supply problem, with sellers unable to meet requests, not only from their regular customers but from outside consumers. This situation is causing an intensification of efforts to speed imports. Total May stocks of domestic lead in all forms decreased more than 11,000 tons to 105,197 tons. Prices are holding unchanged at 5.70c., at St. Louis, and 5.85c., at New York.

Tin Plate

Tin plate departments will generally observe the July 4 holiday and as operations have been at a maximum it is not expected that the loss in tonnage can be made up. Tin plate requirements, especially those for direct or indirect defense needs, are expected to tax the industry's facilities for some time to come.

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Scrap . . . MARKET ACTIVITIES AND QUOTATION TRENDS

• • • **After two weeks** of operations under the revised scrap price schedules, there does not appear to have been any noteworthy improvement in the scrap supply situation. To the contrary, the shortage appears to be growing progressively more serious. A number of districts which heretofore have apparently been adequately supplied are now reporting shortages.

The cast supply question, vital to numerous foundries active on defense work, is especially acute at the moment. The cast shortage has been somewhat overshadowed by the lack of steel scrap, but the possibility of production being lost due to lack of scrap supplies is more likely to hit consumers of cast before consumers of steel grades. Adding to the already serious cast shortage is the increased use of cast by steel mills.

Charges by OPACS that there have been evasions of the scrap ceilings probably has some degree of merit to it, but it has also raised again the complaint, voiced by many consumers, particularly the smaller plants and dealers, that they are unable to obtain official assistance in the matter of interpreting the legalistic phraseology of the official order.

Many consumers, with legitimate questions, have to wait four, five and more weeks to obtain answers to requests for interpretations. In the interim they must still buy material to keep the plant running. This has probably been the cause for some unintentional evasions of the price orders. Many interests insist that it will be necessary to establish regional OPACS offices to expedite handling such problems.

The export question is still unsettled, but opposition to the shipment of scrap abroad and to Canada when domestic mills are unable to supply all their needs on the part of domestic consumers appears to be growing rapidly.

THE IRON AGE composite price is unchanged this week at $19.17.

Pittsburgh

The scrap trade here early this week was busy interpreting official interpretations on the latest amended scrap order. Some confusion has materialized following the changing from the delivered price at key cities to a basing point price from which the shipping point price and the consumers' delivered price are determined. Scrap consumers, on the other hand, are still faced with the necessity to obtain scrap no matter what method is used to establish the price. A strict interpretation of the amended scrap order could mean that No. 1 heavy melting steel in some instances and at some points close to Pittsburgh would have to be sold at a delivered price less than $20. This latter condition, however, is probably theoretical because practically speaking such a consumer would not get the scrap.

Chicago

Scrap has been coming out slowly here for some time and announcement of price revisions has failed to stimulate the flow of material.

Philadelphia

The scrap situation here continues to get worse. The inability to obtain scrap in any quantities seriously threatens to curtail operations in some quarters, and no relief is in sight.

Cleveland

Numerous interpretations have kept the market here in a rather upset state during the past week. The change placing Toledo No. 1 heavy melting at $16.33 apparently will not keep scrap from Cleveland, Canton or Youngstown, although at first dealers were fearful that such would be the case. Toledo is still a base point on stove plate.

Youngstown

According to dealers here scrap is becoming less plentiful steadily and trouble is encountered in filling even the smallest orders. Incoming shipments at principal mills during the past week were not up to consumption. Most plants indicate that shipments will be received on July 4, even though open hearth production is halted.

Buffalo

Thousands of tons of scrap are reported being carried across Niagara River here by barge and rail for reloading onto freight cars bound for steel mills at Hamilton, Ont. Local dealers are exporting some of this scrap but the largest percentage is coming up New York district. Figures are unobtainable but huge stacks of scrap can be seen along the Canadian shore near Fort Erie, Ont., despite the shortage which now threatens to cut down operations on the U. S. side of the border. Some defense melters in dire need of cast scrap are being taken care of here on a day to day basis.

The government schedule of maximum prices of iron and steel scrap was published in the June 26 issue of THE IRON AGE. The prices will be reprinted in the event of any changes.

St. Louis

Brokers here still complain that scrap from the Southwest which should come here is being diverted to Eastern markets. The shortage is being accentuated by hot weather which prevents handling and because farmers are too busy with harvesting to move material.

Boston

Despite all scrap scarcity talk, no inquiries of size have come into the market here for about a week. Yards, brokers and consumers alike say the complicated government scrap plan is largely responsible for the tight supply situation. All say that if the government will stay put on market formulas business might go ahead. However, stock piles in consumer's yards are skimpy. Barge shipments continue at a fairly lively rate, presumably on old orders.

Birmingham

Although the recent price revision on cast grades continues to have a beneficial effect here, demand for scrap generally exceeds supply. Low stocks on dealers' yards is attributed in part to a lack of incentive for peddlers.

New York

Reflecting the urgency of the present scrap situation, sharp competition among several steel mills has developed over some 5000 tons of scrap, mostly rails, which is to be sold by the Board of Transportation of New York. It is reported that very intense efforts are being bent by various mills to acquire this vitally needed scrap. General conditions here continue to deteriorate, with deliveries to dealers' yards in some instances being 50 per cent below May volume. The trend toward more extensive salvage of scrapped machinery, etc., and combing of collections for the more profitable specialties is being accentuated.

Detroit

Brokers insist that the appearance in the market of a second important local consumer at a time when automotive scrap lists are tapering sharply is increasing the scrap shortage and likely to create a serious situation. Dealers' buying prices continue unchanged at the ceiling. Foundry scrap is reported going into open hearth consumption.

Cincinnati

While recent price adjustments have assisted steel mills in this area, old material dealers indicate that the solution of the foundry scrap problem is the most vital.

Steel Exports in April Rise to 515,657 Tons

• • • **Exports of iron and steel,** exclusive of scrap, rose to 515,657 gross tons in April from 512,844 tons in March, the first increase since the record month of August, 1940, according to the Department of Commerce. Scrap metal exports also gained in April, amounting to 120,152 tons, or more than double the 54,383 tons exported in March. Despite the April gain in scrap shipments, exports for the first four months of the current year are substantially below the volume of the comparable period of 1940. Thus far this year 293,968 tons of scrap have been exported, as against 850,253 tons in the first four months of 1940.

Pig iron was, in point of tonnage, the chief material exported in April, three-fold rise lifting the month's total to 86,749 tons from 27,464 tons in March. Following was non-alloy steel ingots, blooms, etc., which totaled but 72,734 tons in contrast with the 124,956 tons in the month preceding. Other leading products in the April export trade included alloy steel ingots, blooms, etc., 38,287 tons; non-alloy other plates, 34,320 tons; non-alloy black steel sheets, 29,300 tons; and tin plate and taggers' tin, 23,310 tons.

The 1526-ton import trade was featured by receipt of 672 tons of flat wire and steel strips and of 405 tons of rails and track material.

Included in the April scrap exports was 118,930 tons of iron and steel scrap consisting of 25,863 tons of No. 1 steel, 47,936 tons of No. 2 heavy melting, 13,662 tons of baled and bundled scrap, 4,073 tons of cast and burnt scrap, and 27,396 tons of other grades.

Scrap imports were down at 1094 tons from the 5401 tons received in March. Even so, cumulative figures for 1941 are running far ahead of 1940—the 1941 figure being 6662 tons and that for the earlier year being 1226 tons.

Cumulative four months' exports of steel, exclusive of scrap metal, totaled 2,208,161 tons, or 31 per cent above the 1,676,910 tons exported in the first four months of 1940. Cumulative imports were 3450 tons through April 30 against 25,558 tons in the comparable 1940 period.

No details of country of destination of the April exports were given in line with the recently announced policy of the Department of Commerce to discontinue publishing such information "in the interest of national and hemispheric defense."

IMPORTS					EXPORTS			
April		Three Months Ended April			April		Four Months Ended April	
1941	1940	1941	1940		1941	1940	1941	1940
....	286	....	4,815	Pig iron	86,749	14,685	241,378	74,815
10	1,507	21	6,147	Ferromanganese and Spiegeleisen[1]	518	111	1,633	5,889
151	64	355	436	Ferrochrome and ferrosilicon[1]	*	*	*	*
....	26	....	190	Other ferroalloys[1]	2,835	312	9,578	2,011
....	368	23	609	Sponge iron	*	*	*	*
1,094	482	6,662	1,226	Scrap: iron, steel, tin plate	120,152	221,152	293,968	850,253
1,255	*2,733*	*7,061*	*13,423*	*Pig iron, ferroalloys and scrap*	*210,254*	*236,260*	*546,557*	*932,968*
....	45	55	406	Ingots, blooms, billets, sheet bars	72,734	79,551	514,225	284,413
*	....	....	....	Ingots, etc.: stainless, other alloy	38,287	553	167,993	4,723
*	....	....	....	Skelp	14,260	989	51,570	15,332
4	1,382	91	3,848	Wire rods	9,894	15,516	44,525	57,584
4	*1,427*	*146*	*4,254*	*Semi-finished steel*	*135,175*	*96,609*	*778,313*	*362,052*
13	8	17	65	Sheets, black iron and steel[2]	30,744	34,197	139,670	158,248
*	....	....	....	Sheets, galvanized iron and steel	9,273	14,012	39,700	62347
*	....	....	....	Sheets, alloy steel	1,798	1,098	3,658	2,751
*	....	....	....	Sheets, stainless	100	198	395	766
2	....	6	4	Plates, plain and fabricated	38,370	41,026	169,318	138,185
*	....	....	....	Plates, alloy	328	219	1,471	923
*	....	....	....	Plates, stainless	3	40	143	104
48	536	108	1,563	Bars, merchant and reinforcing	51,466	42,504	190,733	191,122
....	31	15	189	Bars, iron[3]	304	251	1,442	6,529
*	....	....	....	Bars, alloy steel	8,592	3,176	22,114	8,816
*	....	....	....	Bars, stainless	47	137	249	361
46	183	126	754	Bars, hollow steel	*	*	*	*
....	112	....	571	Hoops, bands, strips, cotton ties	10,285	12,722	53,156	61,178
*	....	....	....	Hoops, bands, strip: alloy steel	87	108	389	333
*	....	....	....	Hoops, bands, strip: stainless	37	74	185	269
*	....	....	....	Piling, sheet	649	534	3,452	2,756
40	46	107	580	Structural shapes	14,287	19,864	109,031	64,152
*	....	....	....	Structural material, fabricated[4]	3,645	3,979	23,501	23,425
12	11	38	37	Tin plate, terne plate, taggers' tin	23,968	32,465	69,304	203,339
*	....	....	....	Tanks, steel	1,312	4,299	8,741	10.171
*	....	....	....	Pipe, welded iron and steel	15,555	7,696	45,426	34,994
94	567	508	1,784	Casing and oil line pipe	14.144	17,477	37,660	74,453
*	....	....	....	Boiler tubes	6121	1,906	18,381	8,223
....	277	24	767	Wire, round iron and steel, telephone	5,781	6,470	21,492	29,521
....	60	71	320	Wire rope, strand, other products	1,582	831	5,485	3,766
....	44	....	44	Wire barbed, woven products	5,316	2,709	19.682	10,843
672	392	1,122	1,195	Wire flat, all other types	12,402	11,779	39,081	40.781
4	17	11	83	Nails, tacks and staples	1,043	545	3,643	2,011
....	24	10	101	Bolts, nuts, rivets, washers, etc.	3,745	1.280	13,804	4,745
405	13	633	310	Rails and track material	11,061	6,629	74,357	43,672
....	3	....	11	Die blocks or blanks, etc.	*	*	*	*
....	....	....	3	All other finished steel	1,852	1,069	12.970	7,484
1.336	*2,324*	*2,796*	*8.381*	*Rolled and finished steel*	*273,897*	*269,294*	*1,128,633*	*1,196.268*
....	....	....	419	Cast iron pipe and fittings	6,613	2,964	19.957	16,750
*	....	....	....	Malleable iron pipe fittings	399	436	1,639	1,741
25	190	109	307	Casting, forgings: iron and steel	7,143	2,541	19,373	9.877
*	....	....	....	Castings, forgings: alloy and stainless	538	462	2,561	1,838
*	....	....	....	Carwheels and axles	1,790	1,704	5.096	5,669
25	*190*	*109*	*726*	*Castings and forgings*	*16,483*	*8,107*	*48,626*	*35,875*
2,620	6,674	10,112	26,784	Total	635,809	610,270	2,502,129	2,527,163

[1] In imports the tonnage shown is the alloy content; the manganese, chromium and silicon content, as the case may be. [2] Imports include skelp and saw plate. [3] Import figure included iron slabs. [4] Imports include sashes and frames only.
* No separate figures.

Construction Steel

. . .STRUCTURAL STEEL, REINFORCING BARS, PLATES, PILING, ETC.

Fabricated Steel

Lettings of 34,000 tons compare with 27,500 tons last week; new projects decline to 15,575 tons from 18,920 tons; plate awards call for 4520 tons.

AWARDS

NORTH ATLANTIC STATES

1700 Tons, Brooklyn Navy Yard, foundry building No. 290, to American Bridge Co., Pittsburgh.

950 Tons, St. Johnsbury, Vt., State bridge, to Phoenix Bridge Co., Phoenixville, Pa.

940 Tons, Camden, N. J., New York Shipbuilding Co., outfitter building, Leonard Shaffer, contractor, to American Bridge Co., Pittsburgh.

940 Tons, Middletown, Pa., airplane dock No. 1, to Bethlehem Steel Co., Bethlehem, Pa.

630 Tons, Lancaster County, Pa., Pennsylvania highway bridge, to American Bridge Co., Pittsburgh.

600 Tons, Rochester, N. Y., boiler house for Rochester Gas & Electric Co., to American Bridge Co., Pittsburgh.

560 Tons, Middletown, Pa., engine repair building, to Lehigh Structural Steel Co., Allentown, Pa.

500 Tons, Watertown, Mass., arsenal warehouse; government will furnish steel.

220 Tons, Branchville, Md., State overpass over Baltimore & Ohio Railroad, to American Bridge Co., Pittsburgh.

190 Tons, Farmingdale, N. Y., administration building, Republic Aviation Corp., to Weatherly Steel Co., Weatherly, Pa.

180 Tons, Kearny, N. J., Federal Shipbuilding & Dry Dock Co., staging towers, etc., to American Bridge Co., Pittsburgh.

145 Tons, Montour County, Pa., Pennsylvania highway bridge, to Phoenix Bridge Co., Phoenixville, Pa.

135 Tons, Morris County, N. J., highway bridge, route 6, to Bethlehem Steel Co., Bethlehem, Pa.

THE SOUTH

730 Tons, Macon, Ga., fuse loading plant, to Lehigh Structural Steel Co., Allentown, Pa.

557 Tons, Bynum, Ala., 6 magazines for ordnance shop, to Virginia Bridge Co., Roanoke, Va.

300 Tons, Phoenix, Ariz., two hangars for government, to an unnamed bidder.

239 Tons, Tallahatchie County, Miss., bridge, to Vincennes Steel Corp., Vincennes, Ind.

160 Tons, Yazoo Co., Miss., bridge, to Vincennes Steel Corp., Vincennes, Ind.

CENTRAL STATES

16,500 Tons, St. Louis, St. Louis ordnance plant, to Bethlehem Steel Co., Bethlehem, Pa.

2150 Tons, Savanna, Ill., ordnance plant, 14 warehouses, to Mississippi Valley Structural Steel Co., Decatur, Ill.

1080 Tons, Columbus, Ohio, nine sheds for Army, to Mount Vernon Bridge Co., Mount Vernon, Ohio.

611 Tons, Burlington, Iowa, bridge, to American Bridge Co., Pittsburgh.

500 Tons, Cleveland, plant for Cleveland Hobbing Machine Co., to Rogers Structural Steel Co., Corry, Pa.

464 Tons, Jackson County, Iowa, bridge, to Clinton Bridge Works, Clinton, Iowa.

250 Tons, Douglas County, Neb., viaduct to Omaha Steel Works, Omaha, Neb.

243 Tons, Draper, S. D., State highway bridge to Bethlehem Steel Co., Bethlehem, Pa.

175 Tons, Worthington, Minn., State bridge No. 5466, to American Bridge Co., Pittsburgh.

170 Tons, Chicago, State Street subway stations, S-10-E, to American Bridge Co., Pittsburgh.

144 Tons, Tama County, Iowa, bridge, to Des Moines Steel Co., Des Moines, Iowa.

133 Tons, Akron, Ohio, factory for Firestone Tire & Rubber Co., to American Bridge Co., Pittsburgh.

107 Tons, Blackhawk County, Iowa, bridge, to Clinton Bridge Works, Clinton, Iowa.

WESTERN STATES

500 Tons, Coram, Cal., 17 bulkhead gates, Bureau of Reclamation, to Southwest Welding & Mfg. Co., Alhambra, Cal.

5000 Tons, Seattle, Wash., camouflage plant, Boeing Aircraft Co., to Worden-Allen Co., Milwaukee, Wis.

500 Tons, Fort Lewis, Wash., Ordnance Building, to Isaacson Iron Works, Seattle, through J. W. Bailey Construction Co., Seattle, contractor.

280 Tons, Fort Lewis, Wash., hangars and boilerhouse, for War Department, to Paxton & Vierling Iron Works, Omaha, Neb.

103 Tons, San Miguel County, Colo., bridge, to Kansas City Structural Steel Co., Kansas City, Kan.

102 Tons, Denver, overpass, to American Bridge Co.

PENDING STRUCTURAL STEEL PROJECTS

NORTH ATLANTIC STATES

3000 Tons, Lakehurst, N. J., two hangars, Karno-Smith, and Duffy Construction Co., contractors; bids taken July 2.

2000 Tons, Brooklyn, boiler house for Navy.

650 Tons, Bristol, Conn., plant "C" for General Motors Corp., New Departure Division.

550 Tons, Philadelphia, extension south end casting plant building for Midvale Co.

375 Tons, Washington hangar Bolling Field, for U. S. Engineers office.

335 Tons, Peekskill, N. Y., six garages for State National Guard.

320 Tons, Passaic County, N. J., grade crossing, Federal project, FAGM-31 (1); bids July 11.

235 Tons, Utica, N. Y., gymnasium addition.

200 Tons, Woodbury, N. J., East Red Bank Avenue underpass for State.

200 Tons, Jefferson County, N. Y., highway bridge; Bero Engineering & Construction Corp., Buffalo, general contractor.

160 Tons, Gloucester County, N. J., highway underpass; bids July 11.

THE SOUTH

1491 Tons, State of Oklahoma, highway bridges, low bidders as follows: Pharoah & Co., 283 tons; El Reno Construction Co., 694 tons; C. K. Howard, 116 tons; J. W. Moorman & Son, 252 tons; and Ottinger Bros., 128 tons.

1100 Tons, Lenoir City, Tenn., 14 radial gates, Fort Loudoun Dam, for TVA.

800 Tons, Rivesville, W. Va., power station.

440 Tons, Louisville, Ky., plant for B. F. Goodrich Co.

400 Tons, Miami, Fla., bascule bridge for Dade County.

300 Tons, Wheeling, W. Va., Chapline St. bridge for city.

215 Tons, Clarksburg, W. Va., calcining building for National Carbon Co.

CENTRAL STATES

900 Tons, Akron, Ohio, power house extensions for Ohio Edison Co.

460 Tons, Ravenna, Ohio, State railroad bridge over highway No. 5.

400 Tons, Portage and Trumbull Counties, Ohio, State project No. 89; bids July 8.

420 Tons, Chicago, building for R. Lavin & Sons, Inc.

265 Tons, St. Paul, State bridge No. 5962.

205 Tons, Mount Sterling, Ohio, bridge No. 49/56 for Baltimore & Ohio Railroad.

120 Tons, various locations, bridge repairs for Northern Pacific Railway.

WESTERN STATES

1600 Tons, Ogden, Utah, 13 warehouse buildings for Army.

140 Tons, Fallbrook, Cal., three storehouses, ammunition depot, for Navy.

325 Tons, Coram, Cal., roof framing for Shasta power plant (Specification 1520-D); American Bridge Co., Chicago, low bidder.

BRITISH WEST INDIES

300 Tons, Port of Spain, Trinidad, warehouse; Walsh Construction Co., New York, and George F. Driscoll, Brooklyn, contractors.

FABRICATED PLATES

AWARDS

3225 Tons, oil tanks for Standard Oil Co. of Kentucky, to be located at various points on a new oil line between Baton Rouge, La., and Macon, Ga., to Ingalls Iron Works Co., Birmingham.

520 Tons, West Henderson, Ky., semi-water gas plant, to Virginia Bridge Co., Roanoke, Va.

474 Tons, Talladega, Ala., 1,000,000-gal. flat reservoir, to Chicago Bridge & Iron Co., Chicago.

300 Tons, San Diego, fleet mooring buoys (Specification 10,452), to Southwest Welding & Mfg. Co., Alhambra, Cal.

PENDING PROJECTS

300 Tons, Mesa, Ariz., elevated water tank (Invitation 280); bids in.

Weekly Bookings of Construction Steel

Week Ended——→	July 1, 1941	June 24, 1941	June 3, 1941	July 2, 1940	Year to Date 1941	Year to Date 1940
Fabricated structural steel awards	34,000	27,500	11,100	11,750	786,910	381,330
Fabricated plate awards	4,520	3,025	1,580	1,765	80,150	67,345
Steel sheet piling awards	990	0	0	2,190	17,945	21,215
Reinforcing bar awards	10,425	13,255	8,300	6,800	327,160	217,200
Total Letting of Construction Steel	49,935	43,780	20,980	22,505	1,212,265	687,090

300 Tons, Victorville, Cal., elevated water tank (Invitation 280); bids in.

SHEET PILINGS

AWARDS

990 Tons, Bremerton, Wash., Navy Yard quay wall (Specification 10,424), divided equally between Columbia Steel Co., San Francisco, and Bethlehem Steel Co., Seattle, through General Construction Co., Seattle, contractor.

PENDING PROJECTS

100 Tons, Portage and Trumbull Counties, Ohio, State project No. 89; bids July 8.

Reinforcing Steel

Awards of 10,425 tons; 20,920 tons in new projects.

AWARDS

ATLANTIC STATES

2000 Tons, Philadelphia, Navy Yard storehouse, to Bethlehem Steel Co., Bethlehem, Pa.; Turner Construction Co., contractor.

1750 Tons, Watertown, Mass., arsenal warehouse; government will furnish the steel.

950 Tons, Binghamton, N. Y., U. S. Engineer's flood control project, section No. 4; to Bethlehem Steel Co., Lackawanna, N. Y., through L. B. Strendberg, Chicago.

250 Tons, Berlin, Conn., bars and mesh, overpass, to American Steel & Wire Co., Worcester, Mass.

105 Tons, Brooklyn Navy Yard, dry docks 5 and 6, to Jones & Laughlin Steel Corp., Pittsburgh; Contractors for Drydocks, Brooklyn, contractor.

SOUTH AND CENTRAL

1700 Tons, Durand, Okla., U. S. Engineer, Atchison, Topeka & Santa Fe Railroad relocation, to Sheffield Steel Corp., Kansas City.

851 Tons, Paducah, Ky., flood wall, section B, unit 2, to Laclede Steel Co., G. E. Tillman, contractor.

340 Tons, Rock Island, Ill., government arsenal, to Laclede Steel Co., St. Louis, through Permanent Construction Co., contractor.

122 Tons, Richland County, Ohio, S. H. D. project No. 37, to Builders Steel Co., Cleveland, Lombardo Brothers, contractors.

120 Tons, Alton, Ill., Western Cartridge Co. water intake, to Laclede Steel Co., St. Louis, Grabbe Construction Co., contractor.

100 Tons, Chicago, Milwaukee Avenue paving, to Bethlehem Steel Co., Bethlehem, Pa.; J. A. McGarry, contractor.

WESTERN STATES

835 Tons, San Diego, Cal., Navy quay wall (Specification 10,456), to Soule Steel Co., Los Angeles, through M. H. Golden, San Diego, contractor.

800 Tons, Bremerton, Wash., Navy quay wall (Specification 10,424), to Bethlehem Steel Co., Bethlehem, Pa.

290 Tons, Los Angeles, W. T. Grant Co. store, to Soule Steel Co., Los Angeles, through Joshua H. Marks-Charde Co., Los Angeles, contractor.

210 Tons, Ogden, Utah, steel fabric for Hill Field (Invitation 235), to Colorado Fuel & Iron Corp., Denver.

PENDING REINFORCING BAR PROJECTS

ATLANTIC STATES

1500 Tons, Bayonne, N. J., Naval Supply Depot, additional depot, additional requirements.

350 Tons, Portland, Me., hospital.

150 Tons, Richmond, Mass., State bridge.

100 Tons, Boston, Navy Yard building No. 21.

100 Tons, Passaic County, N. J., grade crossing, Federal project, FAGM-31 (1); bids July 11.

SOUTH AND CENTRAL

1200 Tons, Norfolk, Va., Navy Yard quay wall, pier No. 5; Drydock Associates, contractors.

400 Tons, Savannah, Ill., 14 inert material warehouses; bids taken.

300 Tons, Chicago, Ill., Revere Copper & Brass, Inc.

120 Tons, Peru, Ill., St. Bede Academy.

Kennedy to Run Riddlesburg Furnace for U.S. Pipe Co.

Philadelphia

• • • U. S. Pipe & Foundry Co., has leased from the Reconstruction Finance Corp., the Riddlesburg, Pa., blast furnace formerly owned by Colonial Iron Co. It is estimated that the furnace will be in operation within 90 days. The furnace, having a daily capacity of 200 tons, has been idle for the past five years. T. W. Kennedy, formerly with Mystic Iron Works, Boston, will be the furnace superintendent.

100 Tons, Newton Falls, Ohio, State project No. 89 in Portage and Trumbull Counties; bids July 8.

WESTERN STATES

6300 Tons, Pacific Ocean Islands, miscellaneous Naval defense construction, Hawaiian-Raymond-Turner & Associates, Alameda, Cal., contractors.

BRITISH WEST INDIES

10,000 Tons, Jamaica, B. W. I., Army defense base.

300 Tons, Port of Spain, Trinidad, dock and warehouse; Walsh Construction Co., New York, and George F. Driscoll, Brooklyn, contractors.

Pipe Lines

Tennessee Gas & Transmission Co., 540 Market Street, Chattanooga, Tenn., plans extensions in welded steel pipe line to Corinth, Miss., for natural gas transmission for local distribution; also will install pipe line distribution system in municipality, with control and operating facilities.

Bureau of Reclamation, Denver, asks bids until July 10 for 6 to 8-in. o.d. steel pipe for water supply lines in connection with relocation of Southern Pacific Railroad, Central Valley project, Cal.; also for fittings (Specification 1525-D).

King County Water District No. 7, Seattle, care of Edward F. Hughes, County-City Building, engineer, will take bids soon for 6, 8 and 10-in. pipe, totaling close to 40,000 ft., for water system in district. New lines will serve as laterals for main city 20-in. line in Fifteenth Avenue N.E. Cost over $45,000.

Houston Industrial Gas Co., Commerce Building, Houston, Tex., plans extensions in welded steel pipe lines for natural gas transmission, including new 3-in. line under and across Greens Bayou, a tributary of Buffalo Bayou.

Plantation Pipe Line Co., Inc., Baton Rouge, La., care of Standard Oil Co. of Kentucky, Inc., 426 West Bloom Street, Louisville, will begin work soon on new 12-in. welded steel pipe line from Baton Rouge and vicinity to Greensboro, N. C., about 1250 miles, for gasoline transmission. Contract for line was let recently to Ford, Bacon & Davis, Inc., 39 Broadway, New York, engineer and contractor. New line will extend from oil refineries in district mentioned through Mississippi, Alabama, Georgia and South Carolina to terminus noted, where bulk storage and distributing plant will be located; lateral lines will be built to furnish gasoline to about 25 army posts and depots along route. A further extension is planned later from Greensboro to Federal naval base at Norfolk, Va. Entire project will cost about $15,000,000 with booster pumping stations and other operating facilities. Plantation company is a recently organized joint subsidiary of Standard Oil Co. of Kentucky; Standard Oil Co. of New Jersey, Inc., New York; and Shell Union Oil Corp., 50 West Fiftieth Street, New York.

Town Council, Gueydan, La., has let contract to Betpouey & Rittiner, Canal Bank Building, New Orleans, at $50,890 for pressure pipe line system for municipal natural gas distribution, including main welded steel pipe line for connection with supply source. F. P. Joseph, Glenmora, La., is consulting engineer.

St. Helens, Ore., plans about 1700 ft. of 8-in. welded steel pipe in connection with new dam on Salmon Creek, for main water line. Financing is being arranged through Federal aid.

Cast Iron Pipe

Waterbury, Conn., is inquiring for about 13 miles of 12, 20, 36 and 42-in. conduit for additional main pipe line. With other improvements expenditure will be $2,000,000. Bids close July 8.

Gorham, Kan., plans about 12,000 ft. of 2, 4 and 6-in. pipe for water system; also pumping station, elevated storage tank and other equipment. Cost about $50,000. Special election is scheduled in July to vote bonds for $20,000, remainder of fund to be secured through Federal aid. Paulette & Wilson, 1006 Kansas Avenue, Topeka, Kan., are consulting engineers.

Lexington Water Co., Lexington, Ky., plans new pipe line for main water supply in parts of city; also will install four new pumping units in waterworks station and make other improvements. Cost about $93,000.

General Purchasing Officer, Panama Canal, Washington, asks bids until July 9 for cement-lined cast iron pipe; also cement-lined cast iron water pipe fittings, gate valves, gaskets, steel bolts, etc. (Schedule 5258).

Livingston, Wis., plans pipe lines for water system and other waterworks installation. Financing in part is being arranged through Federal aid. General Engineering Co., Portage, Wis., is consulting engineer.

Cathlamet, Wash., plans about three miles of 8-in. pipe for main water line to municipality from new water source to be developed on Elokomin River. Other communities in neighboring Puget Sound area plan about 85,000 ft. of 3, 4 and 6-in. pipe for distribution lines, connecting with reservoirs at Cathlamet, which will receive supply from new source noted. Financing is being arranged. John W. Cunningham & Associates, Portland, Ore., are consulting engineers.

Commissioners, Prairie Township, near Kansas City, Kan., care of C. W. McLaughlin, Commercial National Bank Building, Kansas City, Kan., consulting engineer, plans pipe lines for water system, totaling about 48 miles; also other waterworks equipment. Cost close to $545,000.

Board of Water Commissioners, Louisville, plans pipe line extensions in water system; also elevated steel tank and tower, filter plant and other waterworks installation. Cost about $120,000. Harry B. Cassin, Citizens' Building, is consulting engineer.

United States Engineer, Sacramento, Cal., has opened bids for water distribution system at Lemoore, Cal., flying school involving 13,500 ft. of 3-in., 11,600 ft. of 6-in., 14,000 ft. of 8-in., 5000 ft. of 10-in., and other cast iron pipe under invitation 296.

United States Engineer, Sacramento, Cal., has opened bids for water system at Merced, Cal., flying school involving 3700 ft. of 6-in., 11,200 ft. of 8-in., 5800 ft. of 10-in., 3300 ft. of 12-in., and other pipe under invitation 295.

San Diego, Cal., will take bids July 8 on 4138 ft. of 36-in. class 100 cement lined cast iron pipe and accessories.

Santa Monica, Cal., has taken bids on 2000 ft. of 4-in. pipe, 10,000 ft. of 6-in., 5000 ft. of 8-in., and 5000 ft. of 12-in.

Prices of Finished Iron and Steel...

Steel prices on these pages are f.o.b. basing points (in cents per lb.) unless otherwise indicated. On some products either quantity deductions or quantity extras apply. In many cases gage, width, cutting, physical, chemical extras, etc., apply to the base price. Actual realized prices to the mill, therefore, are affected by extas, deductions, and in most cases freight absorbed to meet competition.

Basing Point → / Product ↓	Pittsburgh	Chicago	Gary	Cleveland	Birmingham	Buffalo	Youngstown	Sparrows Point	Granite City	Middletown, Ohio	Gulf Ports, Cars	Pacific Ports, Cars	DELIVERED TO Detroit	New York	Philadelphia
SHEETS															
Hot rolled	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.20¢	2.10¢		2.65¢	2.20¢	2.34¢	2.27¢
Cold rolled[1]	3.05¢	3.05¢	3.05¢	3.05¢		3.05¢	3.05¢		3.15¢	3.05¢		3.70¢	3.15¢	3.39¢	3.37¢
Galvanized (24 ga.)	3.50¢	3.50¢	3.50¢		3.50¢	3.50¢	3.50¢	3.50¢	3.60¢	3.50¢		4.05¢		3.74¢	3.67¢
Enameling (20 ga.)	3.35¢	3.35¢	3.35¢	3.35¢			3.35¢		3.45¢	3.35¢		4.00¢	3.45¢	3.71¢	
Long ternes[2]	3.80¢		3.80¢									4.55¢			
Wrought iron	4.75¢														
STRIP															
Hot rolled[3]	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢		2.10¢			2.10¢		2.75¢	2.20¢		
Cold rolled[4]	2.80¢	2.90¢		2.80¢			2.80¢	(Worcester = 3.00¢)					2.90¢		
Cooperage stock	2.20¢	2.20¢			2.20¢		2.20¢								
Commodity C-R	2.95¢			2.95¢			2.95¢	(Worcester = 3.35¢)					3.05¢		
TIN PLATE Standard cokes (Per 100-lb. base box)	$5.00	$5.00	$5.00						$5.10						
BLACK PLATE 29 gage[5]	3.05¢	3.05¢	3.05¢						3.15¢			4.05¢ ([10])			
TERNES, MFG. Special coated (Per base box)	$4.30		$4.30						$4.40						
BARS															
Carbon steel	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢		(Duluth = 2.25¢)			2.50¢	2.80¢	2.25¢	2.49¢	2.47¢
Rail steel[6]	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢					2.50¢	2.80¢			
Reinforcing (billet)[7]	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢			2.50¢	2.55¢	2.25¢		
Reinforcing (rail)[7]	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢				2.50¢	2.55¢	2.25¢		
Cold finished[8]	2.65¢	2.65¢	2.65¢	2.65¢		2.65¢			(Detroit = 2.70¢)						
PLATES											(Coatesville and Claymont = 2.10¢)				
Carbon steel	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢		2.10¢	2.10¢	2.25¢		2.45¢	2.65¢		2.29¢	2.15¢
Wrought iron	3.80¢														
Floor plates	3.35¢	3.35¢									3.70¢	4.00¢		3.71¢	
Alloy	3.50¢	3.50¢			(Coatesville = 3.50¢)										
SHAPES Structural	2.10¢	2.10¢	2.10¢		2.10¢	2.10¢		(Bethlehem = 2.10¢)			2.45¢	2.75¢		2.27¢	2.215¢
SPRING STEEL C-R															
0.26 to 0.50 Carbon	2.80¢			2.80¢			(Worcester = 3.00¢)								
0.51 to 0.75 Carbon	4.30¢			4.30¢			(Worcester = 4.50¢)								
0.76 to 1.00 Carbon	6.15¢			6.15¢			(Worcester = 6.35¢)								
1.01 to 1.25 Carbon	8.35¢			8.35¢			(Worcester = 8.55¢)								
WIRE[9]															
Bright	2.60¢	2.60¢		2.60¢	2.60¢		(Worcester = 2.70¢)								
Galvanized	2.60¢	2.60¢		2.60¢	2.60¢		(Worcester = 2.70¢)								
Spring	3.20¢	3.20¢		3.20¢			(Worcester = 3.30¢)								
PILING Steel sheet	2.40¢	2.40¢				2.40¢						2.95¢			
IRON BARS Common		2.25¢			(Terre Haute, Ind. = 2.15¢)										
Refined	3.75¢														
Wrought	4.40¢														

[1] Mill run sheets are 10c. per 100 lb. less than base; and primes only. 25c. above base. [2] Unassorted 8-lb. coating. [3] Widths up to 12 in. [4] Carbon 0.25 per cent and less. [5] Applies to 29 gage within certain width and length limitations. [6] For merchant trade. [7] Straight lengths as quoted by distributers. [8] Also shafting. For quantities of 20,000 to 39,999 lb. [9] Carload lot to manufacturing trade. [10] Boxed.

SEMI-FINISHED STEEL

Billets, Blooms and Slabs

Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham, Sparrows Point (Rerolling only). Prices delivered Detroit are $2 higher f.o.b. Duluth, billets only, $2 higher.

	Per Gross Ton
Rerolling	$34.00
Forging quality	40.00

Shell Steel

Basic open hearth shell steel f.o.b. Pittsburgh and Chicago.

	Per Gross Ton
3 in. to 12 in.	$52.00
12 in. to 18 in.	54.00
18 in. and over	56.00

Note: The above base prices apply on lots of 1000 tons of a size and section to which are to be added extras for chemical requirements, cutting to length, or quantity. This type of steel is for hot rolled sections used for the forging of shells and includes rounds, round squares, and special sections.

Sheet Bars

Pittsburgh, Chicago, Cleveland, Youngstown, Buffalo, Canton, Sparrows Point, Md.

	Per Gross Ton
Open hearth or bessemer	$34.00

Skelp

Pittsburgh, Chicago, Youngstown, Coatesville, Pa., Sparrows Point, Md.

	Per Lb.
Grooved, universal and sheared	1.90c.

Wire Rods

(No. 5 to 9/32 in.)	*Per Lb.*
Pitsburgh, Chicago, Cleveland	2.00c.
Worcester, Mass.	2.10c.
Birmingham	2.00c.
San Francisco	2.50c.
Galveston	2.25c.

9/32 in. to 47/64 in., $3 a net ton higher. Quantity extras apply.

ROOFING TERNE PLATE

(F.o.b. Pittsburgh; Package, 112 Sheets)

	20x14 in.	20x28 in.
8-lb. coating I.C...	$6.00	$12.00
15-lb. coating I.C...	7.00	14.00
20-lb. coating I.C...	7.50	15.00
25-lb. coating I.C...	8.00	16.00
30-lb. coating I.C...	8.63	17.25
40-lb. coating I.C...	9.75	19.50

WIRE PRODUCTS

(To the Trade, f.o.b. Pittsburgh, Chicago, Cleveland, Birmingham)

	Base per Keg
Standard wire nails	$2.55
Coated nails	2.55
Cut nails, carloads	3.85
	Base per 100 Lb.
Annealed fence wire	$3.05
	Base Column
Woven wire fence*	67
Fence posts (carloads)	69
Single loop bale ties	59
Galvanized barbed wire†	70
Twisted barbless wire	70

*15½ gage and heavier. †On 80-rod spools in carload quantities.

Note: Birmingham base same on above items, except spring wire.

BOLTS, NUTS, RIVETS, SET SCREWS

Bolts and Nuts

(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

	Per Cent Off List
Machine and carriage bolts:	
½ in. and smaller by 6 in. and shorter	65½
9/16 and ⅝ in. by 6 in. and shorter	63½
¾ to 1 in. by 6 in. and shorter	61
1⅛ in. and larger, all lengths	59
All diameters over 6 in. long	59
Lag, all sizes	62
Plow bolts	65
Nuts, cold punched or hot pressed, hex. or square:	
½ in. and smaller	62
9/16 to 1 in. inclusive	59
1⅛ to 1½ in. inclusive	57
1⅝ in. and larger	56

On above items, excepting plow bolts, additional allowance of 10 per cent for full container quantities.

On all of the above items there is an additional 5 per cent allowance for carload shipments.

Semi-fin. hexagon nuts	U.S.S.	S.A.E.
7/16 in. and smaller	..	64
½ in. and smaller	62	..
½ in. through 1 in.	..	60
9/16 to 1 in.	59	..
1⅛ in. through 1½ in.	57	58
1⅝ in. and larger	56	..

In full container lots, 10 per cent additional discount.

Stove bolts, packages, nuts loose 71 and 10

On stove bolts freight allowed up to 65c. per 100 lb. based on Cleveland, Chicago, New York lots of 200 lb. or over.

Stove bolts in packages, with nuts attached	71
Stove bolts in bulk	80

Large Rivets

(½ in. and larger)

	Base per 100 Lb.
F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham	$3.75

Small Rivets

(7/16 in. and smaller)

	Per Cent Off List
F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham	65 and 5

Cap and Set Screws *Per Cent Off List*

Upset hex. head cap screws U.S.S. or S.A.E. thread 1 in. and smaller	64
Upset set screws, cup and oval points	71
Milled studs	46
Flat head cap screws, listed sizes	36
Filister head cap screws, listed sizes	51

Freight allowed up to 65c. per 100 lb. based on Cleveland, Chicago or New York on lots of 200 lb. or over.

NON-FERROUS PRICES

Cents per lb. for early delivery

	June 25	June 26	June 27	June 28	June 30	July 1
Copper, Electrolytic[1]	12.00	12.00	12.00	12.00	12.00	12.00
Copper, Lake	12.00	12.00	12.00	12.00	12.00	12.00
Tin, Straits, New York[2]	53.00	52.875	52.75	....	52.875	52.875
Zinc, East St. Louis	7.25	7.25	7.25	7.25	7.25	7.25
Lead, St. Louis[3]	5.70	5.70	5.70	5.70	5.70	5.70

[1] Mine producers' quotations only, delivered Conn. Valley. Deduct ¼c. for approximate New York delivery price. [2] Add 0.39c. for New York delivery. [3] Add 0.15c. for New York delivery.

Warehouse Products

Cents per lb., Delivered

Tin	New York	Cleveland
Straits pig	53.60	55.00
Copper		
Electro	13.00	13.50
Castings	12.50	13.00
H. R. Sheets*	20.87	20.87
Seamless tubes*	21.37	21.37
Brass		
Yellow sheets*	19.48	19.48
Yellow, rods*	15.01	15.01
Seamless tubes*	22.23	22.23
Zinc		
Slabs	Nom'al	Nom'al
Sheet, No. 9 casks	Nom'al	Nom'al
Lead		
American pig	6.85	6.35
Bar	8.70	8.85
Cut sheets	9.00	91.0
Antimony		
Asiatic	16.00	17.00
Aluminum		
Virgin, 99%	20.00	21.00
No. 1 remelt, 98-99%	18.00	18.50
Solder		
½ and ½	32.50	32.75
Babbitt		
Anti-friction grade	23.50	21.75

Old Metals

Cents per lb., New York

Buying prices are paid by dealers for miscellaneous lots from smaller accumulators. Selling prices are those charged to consumers after the metal has been prepared for their use.

	Dealers' Buying Prices	Dealers' Selling Prices
Copper		
Hvy. crucible	11.00	11.625
Hvy. and wire	10.00	10.50
Light and bottoms	8.75	9.25
Brass		
Heavy	6.25	6.75
Light	5.25	6.00
No. 1 yel. turn	6.00	6.50
No. 1 red or compo. turnings	9.625	10.625
Hvy. Mach. compo.	9.875	10.125
Lead		
Heavy	5.00	5.50
Aluminum		
Cast	11.00	12.00
Sheet	12.00	13.50
Zinc	....	5.10

Miscellaneous Non-Ferrous Prices

ALUMINUM, delivered: virgin, 99 per cent plus, 17c.-18c. a lb.; No. 12 remelt No. 2, standard, 16c. a lb. NICKEL electrolytic, 35c.-36c. a lb. base refinery, lots of 2 tons or more. ANTIMONY, prompt: Asiatic, 16.50c. a lb., New York; American, 13c. a lb., f.o.b. smelter. QUICKSILVER, $188, per flask of 76 lb. BRASS INGOTS, commercial 85-5-5-5, 13.25c. a lb.

*These prices, which are also for delivery from Chicago warehouses, are quoted with the following percentages allowed off for extras: on copper sheets, 33⅓; on brass sheets and rods, 40; on brass tubes, 33⅓, and copper tubes, 40.

ALLOY STEEL

Alloy Steel Blooms, Billets and Slabs

Base per gross ton, f.o.b. Pittsburgh, Chicago, Canton, Massillon, Buffalo or Bethlehem.....$54.00

Alloy Steel Bars

Base per pound, f.o.b. Pittsburgh, Chicago, Buffalo, Bethlehem, Massillon or Canton.

Open-hearth grade .....2.70c.
Delivered, Detroit .....2.80c.

S.A.E. Series Numbers	Alloy Differential, per 100 Lb.
2000 (1.5 Ni)	$0.35
2100 (1.5 Ni)	0.75
2300 (3.5 Ni)	1.70
2500 (5 Ni)	2.55
3100 Ni-Cr	0.70
3200 Ni-Cr	1.35
3300 Ni-Cr	3.80
3400 Ni-Cr	3.20
4100 Cr-Mo (0.15 to 0.25 Mo.)	0.55
4100 Cr-Mo (0.25 to 0.40 Mo.)	0.75
x4340 Cr-Ni-Mo	1.70
4340 Cr-Ni-Mo	1.85
4600 Ni-Mo (0.2-0.3 Mo, 1.5-2 Ni)	1.20
5100 (0.60-0.90 Cr)	0.35
5100 (0.80-1.10 Cr)	0.45
5100 Cr spring steel	0.15
52-100 Cr. (electric furnace)	2.60
6100 Cr-V bar	1.20
C-V	0.85
6100 Cr-V spring steel	0.85

The above differentials are for hot rolled finished products. The differential for most grades in electric furnace steel is 50c. higher. Slabs with a section area of 16 in. and 2½ in. thick or over take the billet base.

Alloy Cold-Finished Bars

Base per pound, f.o.b. Pittsburgh, Chicago, Gary, Cleveland or Buffalo, 3.35c. Delivered Detroit, 3.45c. carlots.

Alloy Steel Plates

Base per lb., f.o.b. Pittsburgh, Chicago and Coatesville.

Open hearth grade .. ..3.50c.

Therm-O-flake
INSULATING CONCRETE

A Light Weight High Temperature Concrete with Double Insulating Value

The 2½" of THERM-O-FLAKE Concrete shown in an Open Hearth checker chamber bottom is used to protect the concrete foundation pad from excessive temperatures. It is equivalent in insulating effect to about 15" of fire brick.

Reduces usual insulating concrete thickness by about half.

Increases effective depths of flues and checkers in Open Hearth furnace construction.

Protects concrete foundation pads from excessive heat.

Allows increased magnesite thickness in Open Hearth bottoms.

Smooths surface irregularities on Open Hearth bottom pans.

Write for Information and Prices

Other Therm-O-flake Products
Made from Exfoliated Vermiculite
Granules - Coating - Brick - Block

Illinois Clay Products Company
JOLIET, ILL.

STAINLESS AND HEAT-RESISTANT ALLOYS

(Base prices, cents per lb., f.o.b. Pittsburgh)

Chromium-Nickel

No.	304	302
Forging billets	21.25c.	20.40c.
Bars	25.00c.	24.00c.
Plates	29.00c.	27.00c.
Structural shapes	25.00c.	24.00c.
Sheets	36.00c.	34.00c.
Hot rolled strip	23.50c.	21.50c.
Cold rolled strip	30.00c.	28.00c.
Drawn wire	25.00c.	24.00c.

Straight-Chromium

No.	410	430	442	446
Bars	18.50c.	19.00c.	22.50c.	27.50c.
Plates	21.50c.	22.00c.	25.50c.	30.50c.
Sheets	26.50c.	29.00c.	32.50c.	36.50c.
H'tstrip	17.00c.	17.50c.	24.00c.	35.00c.
C'ld st.	22.00c.	22.50c.	32.00c.	52.00c.

20% Chromium-Nickel Clad Steel

	No. 304
Plates	18.00c.*
Sheets	19.00c.

*Includes annealing and pickling.

TOOL STEEL

(F.o.b. Pittsburgh)

	Base per Lb.
High speed	67c.
High-carbon-chromium	43c.
Oil-hardening	24c.
Special	22c.
Extra	18c.
Regular	14c.

Prices for warehouse distribution to all points on or East of Mississippi River are 2c. a lb. higher. West of Mississippi quotations are 3c. a lb. higher.

ELECTRICAL SHEETS

(F.o.b. Pittsburgh)

	Base per Lb.
Field grade	3.20c.
Armature	3.55c.
Electrical	4.05c.
Motor	4.95c.
Dynamo	5.65c.
Transformer 72	6.15c.
Transformer 65	7.15c.
Transformer 58	7.65c.
Transformer 52	8.45c.

Silicon strip in coils—Sheet price plus silicon sheet extra width extra plus 25c. per 100 lb. for coils. Pacific ports add 70c. a 100 lb.

CAST IRON WATER PIPE

Per Net Ton

6-in. and larger, del'd Chicago	$54.80
6-in. and larger, del'd New York	52.20
6-in. and larger, Birmingham	46.00
6-in. and larger f.o.b. dock, San Francisco or Los Angeles or Seattle	56.00

Class "A" and gas pipe, $3 extra; 4-in. pipe is $3 a ton above 6-in. Prices shown are for lots of less than 200 tons. For 200 tons and over, 6-in. and larger is $45 at Birmingham and $53.80 delivered Chicago.

BOILER TUBES

Seamless Steel and Lap Weld Commercial Boiler Tubes and Locomotive Tubes. Minimum Wall

(Net base prices per 100 ft., f.o.b. Pittsburgh, in carload lots)

	Seamless Cold Drawn	Seamless Hot Rolled	Lap Weld, Hot Rolled
1 in. o.d. 13 B.W.G.	$9.01	$7.82	....
1¼ in. o.d. 13 B.W.G.	10.67	9.26	....
1½ in. o.d. 13 B.W.G.	11.70	10.23	$9.72
1¾ in. o.d. 13 B.W.G.	13.42	11.64	11.06
2 in. o.d. 13 B.W.G.	15.03	13.04	12.38
2¼ in. o.d. 13 B.W.G.	16.76	14.54	13.79
2¼ in. o.d. 12 B.W.G.	18.45	16.01	15.16
2½ in. o.d. 12 B.W.G.	20.21	17.54	16.58
2¾ in. o.d. 12 B.W.G.	21.42	18.59	17.54
3 in. o.d. 12 B.W.G.	22.48	19.50	18.35
3½ in. o.d. 11 B.W.G.	28.37	24.62	23.15
4 in. o.d. 10 B.W.G.	35.20	30.54	28.66
4½ in. o.d. 10 B.W.G.	43.04	37,35	35.22
5 in. o.d. 9 B.W.G.	54.01	46.87	44.25
6 in. o.d. 7 B.W.G.	82.93	71.96	68.14

Extras for less carload quantities:

40,000 lb. or ft. over	Base
30,000 lb. or ft. to 39,999 lb. or ft.	5%
20,000 lb. or ft. to 29,999 lb. or ft.	10%
10,000 lb. or ft. to 19,999 lb. or ft.	20%
5,000 lb. or ft. to 9,999 lb. or ft.	30%
2,000 lb. or ft. to 4,999 lb. or ft.	45%
Under 2,000 lb. or ft.	65%

STEEL AND WROUGHT IRON PIPE AND TUBING

Welded Pipe

Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio, Mills

(F.o.b. Pittsburgh only on wrought iron pipe)

Base Price = $200 Per Net Ton

Butt Weld

Steel	Black	Galv.
⅛ in.	56	33
¼ to ⅜ in.	59	40½
½ in.	63½	51
¾ in.	66½	55
1 to 3 in.	68½	57½
Wrought Iron		
¼ and ⅜ in.	+9	+33
½ in.	24	3½
¾ in.	30	10
1 and 1¼ in.	34	16
1½ in.	38	18½
2 in.	37½	18

Lap Weld

Steel		
2 in.	61	49½
2½ and 3 in.	64	52½
3½ to 6 in.	66	54½
7 and 8 in.	65	52½
9 and 10 in.	64½	52
11 and 12 in.	63½	51
Wrought Iron		
2 in.	30½	12
2½ to 3½ in.	31½	14½
4 in.	33½	18
4½ to 8 in.	32½	17
9 to 12 in.	28½	12

Butt weld, extra strong, plain ends

Steel	Black	Galv.
⅛ in.	54½	38½
¼ to ⅜ in.	56½	42½
½ in.	61½	50½
¾ in.	65½	54½
1 to 3 in.	67	57
Wrought Iron		
¼ and ⅜ in.	+10	+46
½ in.	25	6
¾ in.	31	12
1 to 2 in.	38	19½

Lap weld, extra strong, plain ends

Steel		
2 in.	59	48½
2½ and 3 in.	63	52½
3½ to 6 in.	66½	56
7 and 8 in.	65½	53
9 and 10 in.	64½	52
11 and 12 in.	63½	51
Wrought Iron		
2 in.	33½	15½
2½ to 4 in.	39	22½
4½ to 6 in.	37½	21
7 and 8 in.	38½	21½
9 to 12 in.	32	17½

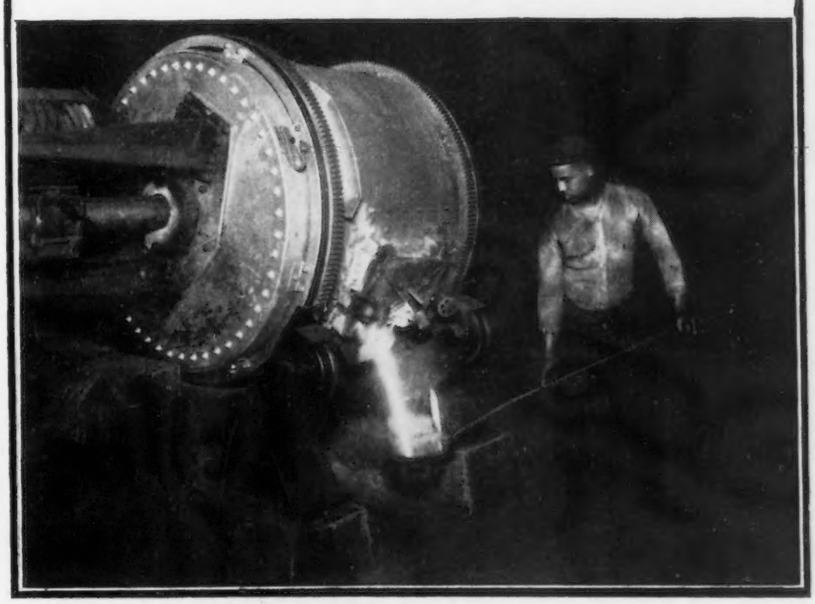
On butt weld and lap weld steel pipe jobbers are granted a discount of 5%. On less-than-carload shipments prices are determined by adding 25 and 30% and the carload freight rate to the base card.

F.o.b. Gary prices are two points lower discount or $4 a ton higher than Pittsburgh or Lorain on lap weld and one point lower discount, or $2 a ton higher, on all butt weld 8 in. and smaller.

8 WAYS YOU PROFIT WITH A DETROIT ROCKING ELECTRIC FURNACE

1—Faster Melting.
2—Lower Metal Losses.
3—Higher Average Quality of Product.
4—Less Machine Shop Scrap
5—Saving in Floor Space and Molding Equipment.
6—Use of Cheaper Raw Materials.
7—Less Labor.
8—Saving of Alloys.

These are but a few of the many advantages of this remarkable furnace. But don't take our word for these claims—find out for yourself. Let us arrange for you to see a few of these furnaces in operation and talk to their owners yourself. Get the low-down first hand from those who know. Write for further facts today.



DETROIT ELECTRIC FURNACE DIVISION
KUHLMAN ELECTRIC COMPANY • BAY CITY MICHIGAN

ORES

Lake Superior Ores

Delivered Lower Lake Ports

	Per Gross Ton
Old range, bessemer, 51.50%..	$4.75
Old range, non-bessemer, 51.50%	4.60
Mesaba, bessemer, 51.50%....	4.60
Mesaba, non-bessemer, 51.50%	4.45
High phosphorus, 51.50%.....	4.35

Foreign Ores*

C.i.f. Philadelphia or Baltimore, Exclusive of Duty

	Per Unit
African, Indian, 44 to 48% Mn.	57c. to 61c.
African, Indian, 49 to 51% Mn.	60c. to 65c.
Brazilian, 46 to 48% Mn...	54c. to 59c.
Cuban, del'd, duty free, 51% Mn.	67½c. to 71c.

	Per Short Ton Unit
Tungsten, Chinese, Wolframite, duty paid, delivered....	$23 to $24
Tungsten, domestic, scheelite, delivered	$23.00
Chrome ore, lump c.i.f. Atlantic Seaboard, per gross ton; South African (low grade).....	Nom.
Rhodesian, 45%	$25.00
Rhodesian, 48% ...	$28.00 to $30.00

RAILS, TRACK SUPPLIES

F.o.b. Mill

Standard rails, heavier than 60 lb., gross ton.....	$40.00
Angle bars, 100 lb.	2.70

F.o.b. Basing Points

Light rails (from billets), gross ton	$40.00
Light rails (from rail steel), gross ton	39.00

	Base per Lb.
Cut spikes	3.00c.
Screw spikes	4.55c.
Tie plates, steel	2.15c.
Tie plates, Pacific Coast.....	2.30c.
Track bolts, steam railroads...	4.15c.
Track bolts, discount to jobbers all sizes (per 100 counts)....	65-5

Basing points, light rails—Pittsburgh, Chicago, Birmingham; spikes and tie plates—Pittsburgh, Chicago, Portsmouth, Ohio, Weirton, W. Va., St. Louis, Kansas City, Minneaqua, Colo., Birmingham and Pacific Coast ports; tie plates alone—Steelton, Pa., Buffalo; spikes alone—Youngstown, Lebanon, Pa., Richmond, Va.

FLUORSPAR *Per Net Ton*

Domestic washed gravel, 85-5 f.o.b. Kentucky and Illinois mines, all rail.....$20.00 to	$21.00
Domestic, f.o.b. Ohio River landing barges .....20.00 to	21.00
No. 2 lump, 85-5 f.o.b. Kentucky and Illinois mines....20.00 to	21.00
Foreign, 85% calcium fluoride, not over 5% Si., c.i.f. Atlantic ports, duty paid.....Nominal	
Domestic No. 1 ground bulk, 96 to 98%, calcium fluoride, not over 2½% silicon, f.o.b. Illinois and Kentucky mines....	31.00
As above, in bags, f.o.b. same mines	32.60

REFRACTORIES

Fire Clay Brick *Per 1000 f.o.b. Works*

Super-duty brick at St. Louis..$64.60	
First quality, Pennsylvania, Maryland, Kentucky, Missouri and Illinois	51.30
First quality, New Jersey.....	56.00
Second quality, Pennsylvania, Maryland, Kentucky, Missouri, and Illinois	46.55
Second quality, New Jersey....	51.00
No. 1 Ohio.....	39.90
Ground fire clay, per ton.....	7.60

Silica Brick

Pennsylvania $51.30	
Chicago District	58.90
Birmingham	51.30
Silica cement, net ton (Eastern)	9.00

Chrome Brick *Net per Ton*

Standard f.o.b. Baltimore, Plymouth Meeting and Chester...$54.00	
Chemically bonded f.o.b. Baltimore, Plymouth Meeting and Chester, Pa.	54.00

Magnesite Brick

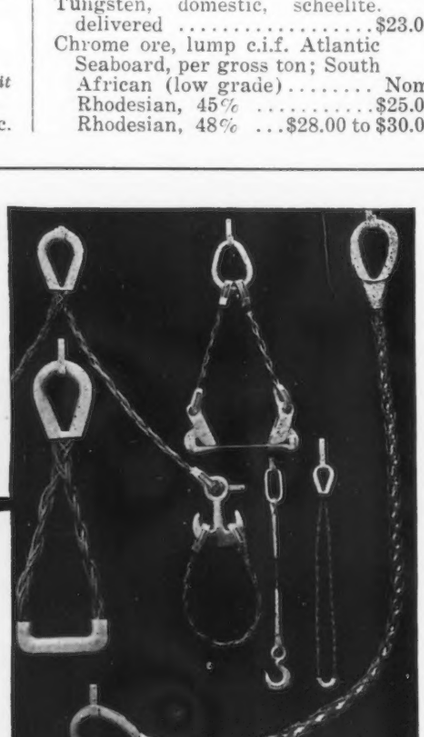
Standard f.o.b. Baltimore and Chester $76.00	
Chemically bonded, f.o.b. Baltimore	65.00

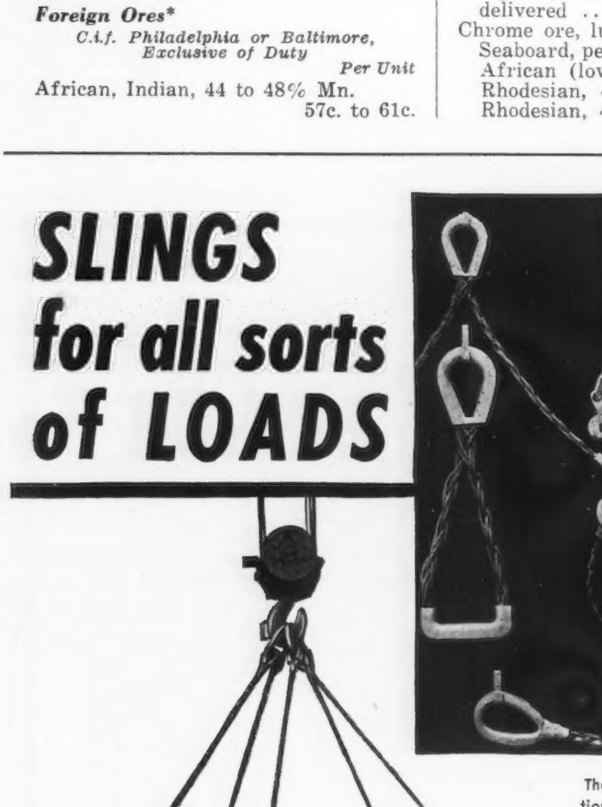
Grain Magnesite

Imported, f.o.b. Baltimore and Chester, Pa. (in sacks).....	(—)*
Domestic, f.o.b. Baltimore and Chester in sacks.....$44.00	
Domestic, f.o.b. Chewelah, Wash. (in bulk)	22.00

*None available.

SLINGS for all sorts of LOADS





These and many other constructions and types of braided safety slings are now made exclusively of genuine Yellow Strand Rope.

Try Yellow Strand Plaited Safety Slings for handling "problem" loads in steel mill and foundry—irregular castings, steel rolls, huge transformers, etc. No shifting or slipping, no marring of highly finished steel—and no load too heavy—for these amazingly flexible, soft, kink-resistant and durable slings.

All plaited safety slings made under the original Murray Patents* are now manufactured by our company, exclusively, and only genuine Yellow Strand is used—the rope unsurpassed in quality and stamina.

Our engineering department is prepared to design a special Yellow Strand Plaited Safety Sling for any special problem.

Broderick & Bascom Rope Co., St. Louis

Branches: New York, Chicago, Houston, Portland, Seattle

Y-13

Yellow Strand Plaited Safety Slings

*Murray Patents: U. S. Patents 1475859, 1524671; Canadian Patents 252874, 258068.

FREE

RIGGERS' HANDBOOK

Contains full data on Plaited Safety Slings, standard Yellow Strand Slings, fittings, etc. No charge, of course.

FERROALLOYS

Ferromanganese

F.o.b. New York, Philadelphia, Baltimore, Mobile or New Orleans.

Per Gross Ton

Domestic, 80% (carload).....$120.00
Domestic, 78-82%, carlots, f.o.b. Tennessee furnaces 145.00

Spiegeleisen

Per Gross Ton Furnace

Domestic, 19 to 21%.....$36.00
Domestic, 26 to 28%..... 49.50

Electric Ferrosilicon

Per Gross Ton, Delivered Lump Size

50% (carload lots, bulk).....$74.50*
50% (ton lots, packed)..... 87.00*
75% (carload, lots, bulk)....135.00*
75% (ton lots, packed).....151.00*

Bessemer Ferrosilicon

Per Gross Ton, F.o.b. Jackson, Ohio

10.00 to 10.50%.....$34.50

For each additional 0.50% silicon up to 12%, 50c. per ton is added. Above 12% add 75c. per ton.

For each unit of manganese over 2% $1 per ton additional.

Base prices at Buffalo are $1.25 a ton higher than at Jackson.

Silvery Iron

Per Gross Ton, F.o.b. Jackson, Ohio

Base Silicon 6.00 to 6.50%.....$29.50*
Buffalo, N. Y. 30.75*

For each additional 0.5% silicon up to 11%, 50c. a ton is added. Above 11% add 75c. a ton.

The lower all-rail delivered price from Jackson or Buffalo is quoted with freight allowed.

Manganese, each unit over 2%, $1 a ton additional. Phosphorus 0.75% or over, $1 a ton additional.

*Official maximum prices established by OPACS on June 25.

Ferrochrome

Per Lb. Contained Cr., Delivered Carlots Lump Size, on Contract

4 to 6% carbon.....11.00c.
2% carbon .....17.50c.
1% carbon .....18.50c.
0.10% carbon .....20.50c.
0.06% carbon .....21.00c.

Spot prices are ¼c. per lb. of contained chromium higher.

Silico-Manganese

Per Gross Ton, Delivered, Lump Size, Bulk, on Contract

3% carbon $113.00*
2.50% carbon 118.00*
2% carbon 123.00*
1% carbon 133.00*

Other Ferroalloys

Ferrotungsten, per lb. contained W, del. carload..... $2.00
Ferrotungsten, 100 lb. and less 2.25
Ferrovanadium, contract, per lb. contained V, del'd $2.70 to $2.90†
Ferrocolumbium, per lb. contained columbium f.o.b. Niagara Falls, N. Y., ton lots ..... $2.25†
Ferrocarbontitanium, 15 to 18% Ti, 7 to 8% C. f.o.b. furnace carload and contract, per net ton.....$142.50
Ferrocarbontitanium, 17 to 20% Ti, 3 to 5% C. f.o.b. furnace, carload and contract per net ton.....$157.50
Ferrophosphorus, electric or blast furnace material, in carloads, f.o.b. Anniston, Ala., for 18%, with $3 unitage, freight equalized with Rockdale, Tenn., per gross ton 58.50
Ferrophosphorus, electrolytic 23-26% in carlots, f.o.b. Monsato (Siglo), Tenn., 24% per gross ton, $3 unitage, freight equalized with Nashville 75.00
Ferromolybdenum, per lb. Mo., f.o.b. furnace ..... 95c.
Calcium molybdate, per lb. Mo, f.o.b. furnace ..... 80c.
Molybdenum oxide briquettes 48-52% Mo, per lb. contained Mo, f.o.b. Langeloth, Pa. 80c.
Molybdenum oxide, in cans. per lb. of contained Mo, f.o.b. Washington, Pa. ..... 80c.

*Spot prices are $5 per ton higher.
†Spot prices are 10c. per lb. of contained element higher.

FUEL OIL

No. 3, f.o.b. Bayonne, N. J.....4.90c.
No. 6, f.o.b. Bayonne, N. J.....3.21c.
No. 5 Bur. Stds., del'd Chicago..3.25c.
No. 6 Bur. Stds.. del'd Chicago..2.75c.
No. 3 distillate, del'd Cleveland..6.25c.
No. 4 indus., del'd Cleveland....5.75c.
No. 5 indus., del'd Cleveland...5.375c.
No. 6 indus., del'd Cleveland...5.00c.

...With Metals Produced and Finished to Aviation Standards of Accuracy

Precision in machine tools — like precision flying — must be backed up by precision methods of alloying, founding, machining and testing vital metal parts. The fact that AMPCO METAL has been accepted by aviation as essential for many highly stressed parts in motor, landing gear and propeller assemblies, is evidence of its tested performance.

AMPCO METAL is an alloy of the aluminum bronze type — outstanding in its strength, wearing qualities and its great resistance to impact, fatigue and corrosion — noted for its ability to make good where all other metals fail. Check up on the possible applications of AMPCO METAL in your product or production tools. Write for "Brief Facts About Ampco Metal."

AMPCO METAL, INC.
Dept IA-73.
MILWAUKEE, WIS.

COKE

Per Net Ton

Furnace, f.o.b. Connellsville, prompt .....$6.00 to $6.25

Foundry, f.o.b. Connellsville, prompt .....$6.75 to $7.00

F'dry, by-product, Chicago..... 10.50

F'dry, by-Product, New England 13.75

Foundry, by-product, Newark or Jersey City .....$12.45 to 12.95

F'dry, by-product, Philadelphia. 12.13

F'dry, by-product, Cleveland... 12.30

F'dry, by-product, Cincinnati... 11.75

Foundry, Birmingham 8.50

F'dry, by-product, St. Louis $10.75 to $11.00

BRITISH

Per Gross Ton, f.o.b. United Kingdom Ports

Ferromanganese, export £29 16s. 3d.

Tin plate, per base box. 32s. to 33s.

Steel bars, open hearth..£16 10s.

Beams, open hearth....£19 10s.

Channels, open hearth...£19 10s.

Angles, open hearth....£15 10s.

Black sheets, No. 24, gage £22 5s. max.* £22 5s. min.**

Galvanized sheets, No. 24 gage £25 12s. 6d max.*; £25 12s. 6d. min.**

*Empire markets only.
**Other than Empire markets.

PIG IRON (Per Gross Ton)

All prices set **in bold face type** are maxima established by OPACS on June 24. Other domestic prices are delivered quotations computed on the basis of the official maxima.

	No. 2 Foundry	Basic	Bessemer	Malleable	Low Phos.
Boston	$25.50	$25.00	$26.50	$26.00	.....
Brooklyn	27.50	.....	.....	28.00	.....
Jersey City	26.53	26.03	27.53	27.03	.....
Philadelphia	25.84	25.34	26.84	26.34	.....
Bethlehem, Pa.	***$25.00***	***$24.50***	***$26.00***	***$25.50***	.....
Everett, Mass.	***25.00***	***24.50***	***26.00***	***25.50***	.....
Swedeland, Pa.	***25.00***	***24.50***	***26.00***	***25.50***	.....
Steelton, Pa.	.....	***24.50***	.....	.....	***29.50***
Birdsboro, Pa.	***25.00***	***24.50***	***26.00***	***25.50***	***29.50***
Sparrows Point, Md.	***25.00***	***24.50***	.....	.....	.....
Erie, Pa.	***24.00***	***23.50***	***25.00***	***24.50***	.....
Neville Island, Pa.	***24.00***	***23.50***	***24.50***	***24.00***	.....
Sharpsville, Pa.*	***24.00***	***23.50***	***24.50***	***24.00***	.....
Buffalo	***24.00***	***23.00***	***25.00***	***24.50***	***29.50***
Cincinnati	24.44	24.61	.....	25.11	.....
Canton, Ohio	25.39	24.89	25.89	25.39	.....
Mansfield, Ohio	25.94	25.44	26.44	25.94	.....
St. Louis	24.50	24.02	.....	.....	.....
Chicago	***24.00***	***23.50***	***24.50***	***24.00***	.....
Granite City, Ill.	***24.00***	***23.50***	***24.50***	***24.00***	.....
Cleveland	***24.00***	***23.50***	***24.50***	***24.00***	.....
Hamilton, Ohio	***24.00***	***23.50***	.....	***24.00***	.....
Toledo	***24.00***	***23.50***	***24.50***	***24.00***	.....
Youngstown*	***24.00***	***23.50***	***24.50***	***24.00***	.....
Detroit	***24.00***	***23.50***	***24.50***	***24.00***	.....
St. Paul	26.63	.....	27.13	26.63	.....
Duluth	***24.50***	.....	***25.00***	***24.50***	.....
Birmingham	***20.38***	***19.00***	***25.00***	.....	.....
Los Angeles, San Francisco and Seattle	27.50	.....	.....	.....	.....
Provo, Utah	***22.00***	.....	.....	.....	.....
Montreal	27.50	27.50	.....	28.00	.....
Toronto	25.50	25.50	.....	26.00	.....

GRAY FORGE

Valley or Pittsburgh fce.....***$23.50***

CHARCOAL

Lake Superior fce.....***$28.00***
Lyles, Tenn. high phos. fce..... ***28.50***
Lyles, Tenn., low phos. fce..... ***33.00***
Delivered Chicago..... 31.34

Switching Charges: Basing point prices are subject to an additional charge for delivery within the switching limits of the respective districts.

Silicon Differentials: Basing point prices are subject to an additional charge not to exceed 50c. a ton for each 0.25 per cent silicon content in excess of base grade (1.75 per cent to 2.25 per cent).

Phosphorous Differential: Basing point prices are subject to a reduction of 38c. per ton for phosphorous content of 0.70 per cent and over.

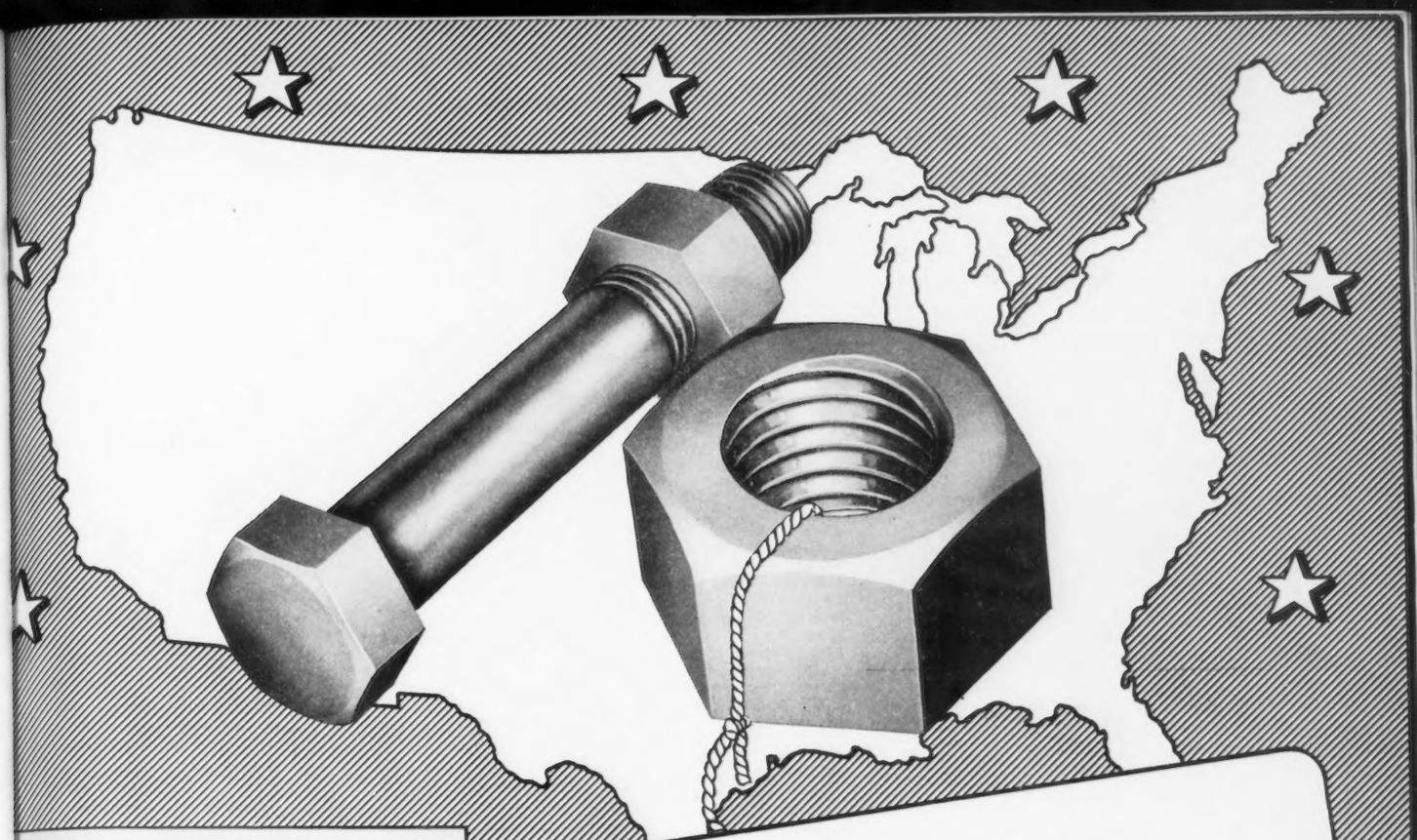
Manganese Differentials: Basing point prices are subject to an additional charge not to exceed 50c. a ton for each 0.50 per cent manganese content in excess of 1.00 per cent.

*Pittsburgh Coke & Iron Co. (Sharpsville, Pa., furnace only) and the Struthers Iron and Steel Co., Struthers, Ohio, may charge 50c. a ton in excess of basing point prices for No. 2 foundry, basic, bessemer and malleable.

WAREHOUSE PRICES

	Pittsburgh	Chicago	Cleveland	Philadelphia	New York	Detroit	Buffalo	Boston	Birmingham	St. Louis	St. Paul	Milwaukee	Los Angeles
Sheets, hot rolled	$3.35	$3.05	$3.35	$3.75	$3.58	$3.43	$3.25	$3.71	$3.45	$3.39	$3.30	$3.38	$5.10
Sheets, cold rolled	....	4.10	4.05	4.05	4.60	4.30	4.30	3.68	....	4.12	4.35	4.23	7.30
Sheets, galvanized	4.75	4.60	4.62	5.00	5.00	4.84	4.75	5.11	4.75	4.24	4.75	4.98	6.30
Strip, hot rolled	3.60	3.40	3.50	3.95	3.96	3.68*	3.82	4.06	3.70	4.99	3.65	3.73	...
Strip, cold rolled	3.20	3.30	3.20	3.31	3.51	3.20	3.52	3.46	....	3.61	3.83	3.54	....
Plates	3.40	3.55	3.40	3.75	3.76	3.60	3.62	3.85	3.55	3.69	3.80	3.68	4.95
Structural shapes	3.40	3.55	3.58	3.75	3.75	3.65	3.40	3.85	3.55	3.69	3.80	3.68	4.95
Bars, hot rolled	3.35	3.50	3.25	3.85	3.84	3.43	3.35	3.98	3.50	3.64	3.75	3.63	**4.15
Bars cold finished	3.65	3.75	3.75	4.06	4.09	3.80	3.75	4.13	4.43	4.02	4.34	3.88	6.60
Bars, ht. rld. SAE 2300	7.20	7.10	7.55	7.31	7.60	7.67	7.35	7.50	....	7.72	7.45	7.58	10.35
Bars, ht. rld. SAE 3100	5.75	5.65	5.85	5.86	5.90	5.97	5.65	6.05	....	6.02	6.00	5.88	9.35
Bars, cd. drn. SAE 2300	8.15	8.15	8.40	8.56	8.84	8.70	8.40	8.63	....	8.77	8.84	8.63	11.35
Bars, cd. drn. SAE 3100	6.75	6.75	7.75	7.16	7.19	7.05	6.75	7.23	....	7.12	7.44	6.98	10.35

BASE QUANTITIES: Hot rolled sheets, cold rolled sheets, hot rolled strip, plates, shapes and hot rolled bars, 400 to 1999 lb., galvanized sheets, 150 to 1499 lb.; cold rolled strip, extras apply on all quantities; cold finished bars, 1500 lb. and over; SAE bars, 1000 lb. and over. Exceptions: Chicago, galvanized sheets, 500 to 1499 lb.; Philadelphia, galvanized sheets, one to nine bundles, cold rolled sheets, 1000 to 1999 lb.; Detroit, galvanized sheets, 500 to 1499 lb.; Buffalo, cold rolled sheets, 500 to 1500 lb., galvanized sheets, 450 to 1499 lb., cold rolled strips, 0.0971 in. thick; Boston, cold rolled and galvanized sheets, 450 to 3749 lb.; Birmingham, hot rolled sheets, strip and bars, plates and shapes, 400 to 3999 lb., galvanized sheets, 500 to 1499 lb.; St. Louis, cold rolled sheets, 400 to 1499 lb., galvanized sheets, 500 to 1499 lb., cold rolled strip 0.095 in. and lighter; Milwaukee, cold rolled sheets, 400 to 1499 lb., galvanized sheets, 500 to 1499 lb.; New York, hot rolled sheets, 0 to 1999 lb., cold rolled sheets, 400 to 1499 lb.; St. Paul, galvanized and cold rolled sheets, any quantity, hot rolled bars, plates, shapes, hot rolled sheets, 400 to 14,999 lbs.; Los Angeles, cold rolled sheets, 300 to 1999 lb., galvanized sheets, 24 ga.—1 to 1499 lb. Extras for size, quality, etc., apply on above quotations. *12 gage and heavier, $3.43. **Over 4 in. wide and over 1 in. thick, $4.95.



Save on ASSEMBLY TIME

BOLTS: Carriage - Machine - Lag - Plow - Stove - Elevator - Step - Tap - Wheel & Rim - Battery - U-Bolts - Tire - Automotive - Drilled - Faced - Special Heat Treated, etc. - **NUTS:** Cold Punched - Semi-Finished - Hot Pressed - Case Hardened - Slotted - Castle - Machine Screw - Marsden Lock - Low Sulphur - **RIVETS:** Standard - Tinners' - Coopers' - Culvert - Clevis and Hinge Pins - **SCREWS:** - Cap - Machine - Hanger - Sheet Metal - Phillips Recessed Head - **WASHERS:** Plate - Burrs - **MATERIALS:** Steels - Alloys - Brass - Bronze - Naval Brass - Everdur - Herculoy - and others - **RODS:** Stove - Seat - Ladder - **PLATED PARTS:** Cadmium - Zinc - Chromium - Nickel - Hot Galvanized - Copper - Tin - **SPECIAL UPSET & PUNCHED PRODUCTS.**

THE selection of EMPIRE Bolts and Nuts to SAVE ON ASSEMBLY TIME represents today's national trend on the part of leading industrialists to deliver speed to production lines. SAVING ON ASSEMBLY TIME with EMPIRE Bolts and Nuts results from the superior accuracy of thread, greater strength, and harder surface found in all EMPIRE Threaded Fastenings.

Since 1845, RB&W has pioneered in the development of bolts, nuts, and other threaded fastenings of outstanding quality and consistent uniformity. Through good times and bad, rush periods and slow, these remarkable EMPIRE Fastenings have been satisfactorily delivered to all customers, both large and small, whenever needed.

RB&W anticipated needs of the future and prepared during the past few years to meet all national emergencies by installing new machines, plant expansions and augmented service facilities. RB&W customers will continue to receive the quality and service to which they are accustomed.

25

BOLTS EMPIRE NUTS-RIVETS

RUSSELL, BURDSALL & WARD
BOLT AND NUT COMPANY

PORT CHESTER, N.Y. ROCK FALLS, ILL. CORAOPOLIS, PA.

Sales Possibilities

. . . CONSTRUCTION, PLANT EXPANSION AND EQUIPMENT BUYING

North Atlantic States

● **Sprague Meter Co.,** South Avenue, Bridgeport, Conn., cast iron gas meters, parts, etc., has let general contract to Edward E. Bray Co., 362 River Street, for one-story addition. Cost close to $45,000 with equipment. Leo F. Caproni, 1221 Chapel Street, New Haven, Conn., is architect and engineer.

Thompson Wire Co., 41 Mildred Avenue, Boston, round and flat wire products, has let general contract to Fiske-Carter Construction Co., 8 Norwich Street, Worcester, Mass., for one-story addition to branch plant at Worcester, 60 x 180 ft. Cost close to $100,000 with equipment.

Remington Arms Co., Inc., Bridgeport, Conn., fire arms and ammunition, has contracted with War Department, Washington, for new plant near Salt Lake City, Utah, for production of small arms ammunition for government. It will include shops, boiler plant and auxiliary structures, with facilities for employment of over 8000 persons. Cost about $30,000,000. Fund in that amount will be furnished by government.

New England Lacquer Co., Dexter Road, East Providence, R. I., has let general contract to Henry M. Soule Co., 110 Armistice Boulevard, Pawtucket, R. I., for one-story and basement addition, 50 x 100 ft. Cost about $45,000 with equipment.

Bureau of Yards and Docks, Navy Department, Washington, has let general contract to Aberthaw Co., 80 Federal Street, Boston, for new dry dock and auxiliary structures at Portsmouth, N. H., Navy Yard. Cost about $2,500,000 on cost-plus-fixed-fee basis.

Mathieson Alkali Works, Inc., 60 East Forty-second Street, New York, plans expansion in branch plant at Lake Charles, La., forming new production unit for metallic magnesium for aircraft industry, including lime works, electro-chemical plant, reaction plant, chlorine works and other divisions. A new steam-electric power plant also is planned at works. Entire project to cost over $6,000,000 with machinery.

Frisch & Co., Inc., 544 Cassanova Street, New York, paints, varnishes, oils, etc., has purchased two-story building, about 20,000 sq. ft. of floor space, at 565 Barry Street, Hunts Point district, with adjoining land for erection of one-story addition for varnish division. Present plant will be removed to new location and capacity increased.

Todd Shipyards Corp., 1 Broadway, New York, plans expansion in two plants, comprising Robins Dry Dock & Repair Co., foot of Dwight Street, Brooklyn; and Tietjen & Lang Dry Dock Co., Seventeenth Street and Park Avenue, Hoboken, N. J., with facilities for construction of vessels for U. S. Maritime Commission. Details and estimates of cost are being determined. Plans have been completed for new boiler plant at Brooklyn yard noted. Cost over $100,000 with boilers and auxiliary equipment. Albert Kahn Associated Architects & Engineers, Inc., Detroit, is architect and engineer.

Johns-Manville Corp., 22 East Fortieth Street, New York, building products, is concluding contract with War Department, Washington, for new plant near Parsons, Kan., for shell-loading, including artillery ammunition and bombs, to include machine shops, pumping station, steam power house and accessory structures. Cost about $35,000,000, appropriation in that amount to be furnished by government, which will retain title to plant.

Niagara Blower Co., Inc., 673 Ontario Street, Buffalo, has let general contract to Edward C. Boehm, Inc., 110 Franklin Street, for one-story addition. Cost close to $50,000 with equipment.

U.S.L. Battery Corp., 3215 Highland Avenue, Niagara Falls, N. Y., electric storage batteries, parts, etc., a subsidiary of Electric Auto-Lite Co., Toledo, has let general contract to A. K. Adams & Co., Inc., 542 North Plum Street, N.W., Atlanta, Ga., for new one-story branch plant at East Point, near Atlanta. Cost over $200,000 with equipment.

Bell Aircraft Corp., 2050 Elmwood Avenue, Buffalo, has let contract to Austin Co., Cleveland, for design and construction of one-story addition to plant near municipal airport at Niagara Falls, N. Y., for expansion in assembling division. Cost over $250,000 with equipment.

Remington-Rand, Inc., 465 Washington Street, Buffalo, has let general contract to Lee Construction Co., 422 South Church Street, Charlotte, N. C., for new two-story factory branch, storage and distributing building at West Third and South Church Streets, Charlotte. Cost over $50,000 with equipment.

Thermoid Co., Whitehead Road, Trenton, N. J., mechanical rubber products, brake linings, etc., has asked bids on general contract for one-story addition, 100 x 200 ft. Cost over $85,000 with equipment. Micklewright & Mountford, 224 East Hanover Street, are architects.

Philip Carey Mfg. Co., Inc., Lockland, Cincinnati, roofing products, insulation specialties, etc., has purchased former plant of Pardee Tile Works, Inc., Perth Amboy, N. J., consisting of one and multi-story buildings, totaling about 200,000 sq. ft. of floor space, and will begin work in September on modernization and improvements for new Eastern branch plant. Facilities will be installed for employment of more than 400 persons. Company also has purchased about seven acres adjoining for future expansion.

Gemex Co., 170 Thomas Street, Newark, N. J., plated and novelty jewelry and allied specialties, has let general contract to Frank D. Trainer & Son, Inc., 12 Smith Street, Irvington, N. J., for new one-story plant, 175 x 300 ft., at Commerce Street and line of Rahway Valley Railroad, Union, N. J. Cost over $100,000 with equipment. Present works will be removed to new location and capacity increased.

Construction Officer, Naval Air Station, Lakehurst, N. J., has let general contract to Karno-Smith Co., Inc., Broad Street Bank Building, Trenton, N. J., for two new hangars, each about 150 x 400 ft., and 120 ft. high, shops and extensions to present aircraft instruction schools. Cost about $2,000,000 with equipment.

Gordon Baking Co., 2303 East Vernor Highway, Detroit, has let general contract to H. D. Best-McCaffrey Co., 419 Fourth Avenue, New York, for new one-story and basement Eastern branch baking and distributing plant, 90 x 185 ft., at Kearny, N. J. Cost close to $100,000 with ovens, mixers, conveyors and other mechanical equipment.

Coca-Cola Bottling Co. of Pennsylvania, Inc., Tenth Avenue, Bethlehem, Pa., has asked bids on general contract for new one-story mechanical-bottling, storage and distributing plant, 235 x 250 ft. Cost over $175,000 with equipment. Jesse M. Shelton, Bona-Allen Building, Atlanta, Ga., is architect.

Department of Supplies and Purchases, City Hall Annex, Philadelphia, Charles H. Grakelow, director, asks bids until July 8 for steel pipe struts (Class 415), valves and sleeves (Class 418), electric cable (Class 419), battery charger units (Class 423) and chain link fabric fence (Class 424) for period from July 9 to Dec. 31, 1941.

Hamilton Watch Co., Inc., Columbia Avenue, Lancaster, Pa., has let general contract to D. S. Warfel, North Prince Street, for four-story and basement addition, about 45 x 200 ft. Cost close to $175,000 with equipment. Prack & Prack, Martin Building, Pittsburgh, are architects.

Reading Steam Heating Co., Inc., 615 Elm Street, Reading, Pa., plans extensions and improvements in central steam power plant, including additional equipment. Cost over $65,000. Muhlenberg, Yerkes & Muhlenberg, Ganster Building, are architects.

Ellwood City Forge Co., Ellwood City, Pa., plans one-story addition, about 85 x 200 ft. Cost close to $80,000 with equipment.

Pittsburgh & Lake Erie Railroad, P. & L. E. Railroad Terminal, Pittsburgh, J. H. James, purchasing agent, asks bids until July 8 for brake shoes and chilled iron car wheels (Serial Contract No. 2-1941).

General Purchasing Officer, Panama Canal, Washington, asks bids until July 7 for three portable conveyors for handling scrap metal materials, and one conveyor for handling scrap lumber (Schedule 5239).

Chemical Warfare Service, Edgewood Arsenal, Edgewood, Md., asks bids until July 7 for air compressors (Circular 1194).

Alban Tractor Co., Inc., 725 East Twenty-fifth Street, Baltimore, road machinery and contractors' equipment, plans new one and two-story shop, storage and distributing plant, about 100 x 100 ft., with repair and maintenance departments. Cost close to $80,000 with equipment.

Bureau of Ordnance, Navy Department, Washington, asks bids until July 15 for gun forgings.

Bureau of Yards and Docks, Navy Department, Washington, plans new naval base at Sabine Pass, Tex., including docks, mechanical shops, storage and distributing buildings, and other structures. Cost over $500,000.

The South

● **Cities Service Co.,** 60 Wall Street, New York, and Bartlesville, Okla., is arranging with government for new plant near Marche, vicinity of Little Rock, Ark., for production of picric acid and allied specialties for War Department, Washington. It will consist of one and multi-story buildings, with auxiliary structures, boiler plant, machine shop, pumping station and other units, and will be known as Maumelle Ordnance Works. Fund of about $8,000,000 will be furnished by government for land, buildings and machinery.

Public Works Officer, Norfolk Navy Yard, Portsmouth, Va., asks bids (no closing date stated) for one-story addition, 100 x 240 ft., to sub-assembling shop No. 261, with crane runway extension outside of building, 80 x 100 ft., and wet slip, about 50 x 100 ft. (Specification 10500).

Alabama Power Co., Birmingham, has authorized expansion in steam-electric generating plant at Gorgas, Ala., installation to include new 60,000-kw. turbine-generator unit and accessories; high-pressure boiler with steam-generating capacity of 600,000 lb. per hr., using pulverized coal as fuel; and auxiliary equipment. Award for electric generator has been made to General Electric Co., Schenectady, N. Y., and inquiries for other required equipment will be made soon. Cost over $3,500,000, including transmission line extensions.

Fayette County Board of Education, Court House, Lexington, Ky., D. Y. Dunn, superintendent, has approved plans for new one-story vocational shop at local Lafayette high school. Cost about $90,000 with equipment. John T. Gillig, Radio Building, is architect.

Savannah Sugar Refining Corp., Savannah, Ga., plans expansion on part of five-acre adjoining tract, including extensions in docks, storage and distributing buildings, and other facilities. Cost over $100,000 with equipment.

United States Engineer Office, Mobile, Ala., asks bids (no closing date stated) for three-story aircraft engine-testing building at local Brookley Field, 100 x 315 ft.; installation to

... Carbon Molybdenum Steel has proved its economy for steam power plant service.

Operating savings obtained from high steam temperatures and pressures would justify using expensive steels to avoid steam line trouble. Fortunately, an inexpensive Carbon-Molybdenum (0.50% Mo) steel does the job.

Its creep strength up to 1000° F, plus its easy weldability, make for light, leak-proof lines. The use of thinner sections sometimes reduces the already small cost differential over unalloyed steels.

Write for technical book, "Molybdenum in Steel".

CLIMAX FURNISHES AUTHORITATIVE ENGINEERING DATA ON MOLYBDENUM APPLICATIONS.
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MOLY

include 13 hydraulic freight elevators (Circular 485).

Carter Oil Co., Inc., Tulsa, Okla., plans new plant near Stamps, Ark., for treating of "sour gas" from McKamie gas field in that vicinity, for use as fuel at new electric power plant to be built in that area by Arkansas Power & Light Co., Pine Bluff, Ark. Plant will consist of several units for processing for removal of sulphur content, to be sold as a by-product, with compressor station, boiler house, shops and other structures. Cost over $350,000 with equipment. Electric power plant will represent investment of approximately $3,000,000.

Houston Shipbuilding Corp., Chronicle Building, Houston, Tex., has let general contract to Brown & Root, Inc., 4300 Calhoun Road, for one-story plate shop, 30 x 250 ft., at shipbuilding yard, Houston ship channel. Cost about $100,000 with equipment.

Central States

• **American Fork & Hoe Co.,** Keith Building, Cleveland, has let general contract to P. H. Owen, 2884 Woodbury Road, for one-story addition, 50 x 112 ft., to branch plant at Geneva, Ohio. Cost over $65,000 with equipment. C. B. Rowley, Keith Building, is architect.

R. K. LeBlond Machine Tool Co., Madison and Edward Roads, Norwood, Cincinnati, plans extensions and improvements in power plant, including additional equipment. Cost close to $75,000 with equipment. Fosdick & Hilmer, Union Trust Building, are consulting engineers.

Universal Tool Co., First and Madison Streets, Dayton, Ohio, has awarded general contract to Henry Stock & Son, Inc., Dayton, for new one-story plant on Leo Street, about 12,000 sq. ft. of floor space. Cost close to $60,000 with equipment.

Clark Controller Co., 1146 East 152nd Street, Cleveland, will begin superstructure for one-story machine shop, 30 x 100 ft., for which general contract recently was let to J. L. Hunting Co., Ninth & Chester Building. Cost over $50,000 with equipment.

Cleveland Electric Illuminating Co., 75 Public Square, Cleveland, has authorized expansion in steam-electric generating plant at Avon, to include new 50,000-kw. turbine-generator unit and accessories, high-pressure boiler and auxiliary equipment. Cost about $3,500,000 with transmission line extensions and other facilities. Electric generator award has been made to General Electric Co., Schenectady, N. Y., and contracts for other equipment will be made soon.

Meters & Pumps, Inc., 9615 Meech Street, Cleveland, pumping machinery, blowers and other mechanical equipment, has let general contract to Charles E. Lewis & Son, 1200 Green Road, for one-story addition, about 50 x 155 ft., with office structure, 20 x 65 ft. Cost over $65,000 with equipment. Hays, Simpson & Hunsicker, 7829 Euclid Avenue, are architects.

Continental Steel Corp., West Markland Avenue, Kokomo, Ind., wire fencing, wire nails and other wire goods, has plans for one-story addition, 135 x 143 ft. Cost over $80,000 with equipment. L. E. Smith is company engineer in charge.

Perfect Circle Co., Hagerstown, Ind., piston rings, etc., has let general contract to Carl M. Geupel Construction Co., Hume-Mansur Building, Indianapolis, for two-story addition, about 9400 sq. ft. of floor space. Cost over $50,000 with equipment.

Evansville Refining Co., Evansville, Ind., plans replacement of steel storage tanks and other facilities, providing about 20,000-bbl. crude oil capacity, recently destroyed by fire. Loss over $50,000.

Hercules Powder Co., Inc., Delaware Trust Building, Wilmington, Del., has arranged with government for new plant at Louisiana, Mo., for production of synthetic ammonia for powder and high-explosives for War Department, Washington, consisting of several multi-story production units, with one-story adjoining buildings for auxiliary service, machine shops, pumping station, boiler house and other structures. Cost about $16,750,000 and fund in that amount will be secured from government.

Combustion Engineering Co., 5319 Shreve Avenue, St. Louis, boilers and other power plant equipment, has let general contract to Fruin-Colnon Contracting Co., Merchants Laclede Building, for one-story shop addition. Cost close to $40,000 with equipment.

Stearman Aircraft Division, Boeing Aircraft Co., South Oliver Road, Wichita, Kan., has let general contract to Austin Co., Cleveland, for one-story addition, about 300 x 1000 ft., for parts production and assembling of bomber planes for government. This is part of $10,000,000 expansion for similar manufacture for which fund has been secured through government.

United States Engineer Office, Court House and Custom House, St. Louis, asks bids (no closing date stated) for 33,000-volt power substation at Jefferson Barracks, Mo., including outdoor and indoor switching stations, and other facilities (Circular 201).

Redford Tool & Die Co., 17170 Rockdale Avenue, Detroit, plans one-story addition. Cost about $45,000 with equipment. C. R. Jensen and H. J. Keough, 3757 Gladstone Street, are architects.

State Board of Education, Lansing, Mich., has asked bids on general contract for one-story aviation mechanics' shop at Western Michigan College of Education, Kalamazoo, Mich. Cost over $80,000 with equipment. Stewart-Kingscott Co., Kalamazoo, is architect.

Tomkins-Johnson Co., Jackson, Mich., milling cutters, chucks, valves, etc., has let general contract to North-Moller Co., Jackson, for one-story addition. Cost about $50,000 with equipment.

Kelsey-Hayes Wheel Co., Inc., 3600 Military Avenue, Detroit, automobile wheels, rims, etc., has arranged with government for new local plant for production of machine guns for War Department, consisting of a main one and multi-story unit and auxiliary structures. Fund of $5,800,000 will be provided by government.

Charlotte Tool & Die Products Co., Charlotte, Mich., recently organized to manufacture tools, dies, gages and allied products, has taken option on building formerly used by Jordan & Steele Mfg. Co., for a new works. New company will be associated with Standard Stamping Co., with adjacent plant.

Graf-Apsco Co., Inc., 109 West Hubbard Street, Chicago, scientific instruments and parts, has approved plans for extensions and improvements in one and two-story building, 37 x 125 ft., at Broadway and Rosedale Avenue, for expansion. Mark D. Kalischer, 520 North Michigan Avenue, is architect.

Falk Corp., 3001 West Canal Street, Milwaukee, gears, speed reducers, couplings, etc., has let general contract to Klug & Smith Co., 111 East Wisconsin Avenue, for one-story addition, 180 x 475 ft., with two-story office and operating building, 40 x 200 ft. Cost over $700,000 with equipment.

Bureau of Reclamation, Denver, asks bids until July 8 for one high-pressure gate assembly for gate chamber at outlet works, Jackson Gulch dam, Mancos project, Colo., consisting of one gate, 2 ft. 9 in. square, one 31,000-lb. hydraulic hoist, and one 10,000-lb. semi-automatic gate hanger (Specification 1524-D).

Warner Electric Brake Mfg. Co., Beloit, Wis., has let general contract to Cunningham Brothers, 359 East Grand Avenue, for one-story addition to plant at South Beloit, Ill., 120 x 120 ft., for expansion in machine shop. Cost over $100,000 with equipment. W. Fred Dolke, 2204 Merchandise Mart, Chicago, is architect.

Industrial Gear Mfg. Co., 4539 West Van Buren Street, Chicago, has let general contract to Goodwin Construction Co., 320 South Spaulding Avenue, for one-story addition, 75 x 150 ft. Cost over $65,000 with equipment. Frank J. Lapasso, 8 South Dearborn Street, is architect.

Western States

• **Philadelphia Quartz Co.,** 121 South Third Street, Philadelphia, industrial chemicals, has let general contract to Christensen & Lyons Co., Oakland, Cal., for branch plant on Taylor Way, Tacoma, Wash., for production of sodium silicates, for conversion for liquid mineral adhesives and other specialties. Cost about $250,000 with machinery.

Sampson Motors, Inc., 6031 South Gramercy Place, Los Angeles, automobile equipment, has let general contract to Schuck Construction Co., 1937 West Sixty-second Street, for one-story addition, 60 x 113 ft., for a machine shop. Cost over $50,000 with equipment.

Public Works Officer, Mare Island Navy Yard, Vallejo, Cal., asks bids until July 9 for mechanical facilities for dry dock No. 4, and connecting quaywalls between dry docks Nos. 3 and 4, and 2 and 3, respectively, including piping, valves and accessories for compressed air, steam, water and other service (Specifications 10458).

Carlson Shipyard Co., 1800 Bayview, Bellingham, Wash., has leased waterfront property at LaConner, Wash., owned by municipality, for new boat-building plant, comprising shipway, dock, mechanical shops and other facilities. Estimates of cost are being made.

Construction Quartermaster, Fort Mason, Cal., has low bid from Leo Epp, 4745 Geary Boulevard, San Francisco, at $573,877 for one-story machine shop, and two warehouse buildings at Benicia Arsenal, Solano County, Cal., exclusive of equipment, which will be purchased separately.

Autometric Machine Tool Co., Ninth Street and Dwight Way, Berkeley, Cal., will take bids soon on general contract for one-story addition, 100 x 200 ft., for a machine shop. Cost over $70,000 with equipment. L. H. Nishkian, 525 Market Street, San Francisco, is architect and engineer.

Canada

• **Galt Art Metal Co., Ltd.,** 385 Dundas Street, Galt, Ont., has let general contract to Dunker Construction Co., Ltd., 257 King Street West, Kitchener, Ont., for one-story addition, 100 x 200 ft. Cost over $85,000 with equipment. B. A. Jones, 31 Ontario Street South, Galt, is architect.

Dominion Bridge Co., Ltd., Lachine, Que., plans early call for bids for one-story rolling mill at Vancouver, B. C. Cost over $250,000 with equipment.

Ford Motor Co. of Canada, Ltd., Windsor, Ont., has plans for one-story addition for a heat-treating unit. Cost close to $200,000 with equipment.

Burrard Rivets & Forgings, Ltd., Hall Building, Vancouver, B. C., plans new one-story plant on local site. Cost over $75,000 with equipment.

Davis Automatic Controls Co., 145 Wellington Street West, Toronto, has plans for a factory at 201 Niagara Street, to cost about $50,000 with equipment.

Aluminum Co. of Canada, Ltd., 1155 Metcalfe Street, Montreal, plans erection of brucite refining plant at Wakefield, Que., to cost about $75,000 with equipment.

Powell River Co., Vancouver, B. C., plans addition to sulphite pulp mill and extension to power development at Louis River, B. C., to cost $2,000,000 including equipment.

Page Hersey Tubes, Ltd., 100 Church Street, Toronto, will build addition to its plant at Crowland, Ont., to cost about $60,000 and has let general contract to Dickie Construction Co., Ltd., 17 Yorkville Avenue, Toronto. Contract for traveling cranes has been awarded to Dominion Bridge Co., Ltd. Margison & Babcock, 210 Dundas Street West, Toronto, are engineers.

Canada Iron Foundries, Ltd., 227 St. Maurice Street, Three Rivers, Que., has awarded general contract to Joseph Renaud, 145 Lavoilette Street, for plant addition to cost about $100,000 with equipment.